

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

T-33-05

MRF531

The RF Line

NPN SILICON HIGH FREQUENCY TRANSISTOR

... designed for high voltage and high current f_T switching applications. These devices are also ideal for CRT drivers.

- High Collector-Emitter Breakdown Voltage —
 $V_{(BR)CEO} = 100 \text{ Vdc (Min) @ } I_C = 10 \text{ mAdc}$
- High Current-Gain — Bandwidth Product —
 $f_T = 800 \text{ MHz (Typ) @ } I_C = 50 \text{ mAdc}$
- Characterized with Safe Operating Area (SOA) Curves

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	100	Vdc
Collector-Base Voltage	V_{CBO}	100	Vdc
Emitter-Base Voltage	V_{EBO}	35	Vdc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	25 14	Watts mW/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	25	$^\circ\text{C/W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	100	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1 \text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	100	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1 \text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	35	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 75 \text{ Vdc}$, $V_{BE} = 0$)	I_{CES}	—	—	10	μAdc

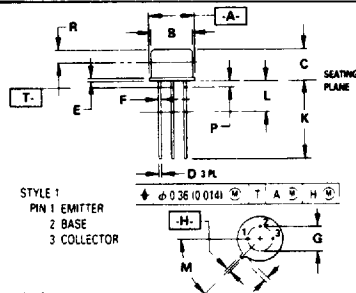
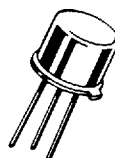
ON CHARACTERISTICS

DC Current Gain ($I_C = 50 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$)	h_{FE}	25	—	—	—
Collector-Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 1.0 \text{ mAdc}$)	$V_{CE(sat)}$	—	—	1.0	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 50 \text{ mAdc}$, $V_{CE} = 25 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	500	800	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	—	4.0	pF
Input Capacitance ($V_{BE} = 3.0 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$)	C_{ib}	—	9.0	—	pF

HIGH FREQUENCY TRANSISTOR NPN SILICON



NOTES

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION J MEASURED FROM DIMENSION A MAXIMUM.
4. DIMENSION B SHALL NOT VARY MORE THAN 0.025 (0.010) IN ZONE R. THIS ZONE CONTROLLED FOR AUTOMATIC HANDLING.
5. DIMENSION F APPLIES BETWEEN DIMENSION P AND L. DIMENSION D APPLIES BETWEEN DIMENSION L AND K. MINIMUM LEAD DIAMETER IS UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.39	0.335	0.370
B	7.75	8.50	0.305	0.335
C	6.10	6.60	0.240	0.260
D	0.41	0.53	0.016	0.021
E	0.23	0.34	0.009	0.041
F	0.41	0.48	0.016	0.019
G	5.08 BSC		0.200 BSC	
H	0.72	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	19.05	0.500	0.750
L	6.35		0.250	
M	45 BSC		45 BSC	
P		1.27		0.050
R	2.54		0.100	

CASE 79-04
TO-205AD
(TO-39)

MRF531

MOTOROLA SC (XSTRS/R F)

46E D



6367254

0094739 4



M0T6

T-33-05

FIGURE 1 - CURRENT-GAIN - BANDWIDTH PRODUCT

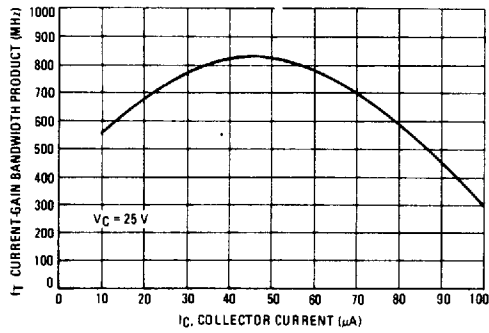
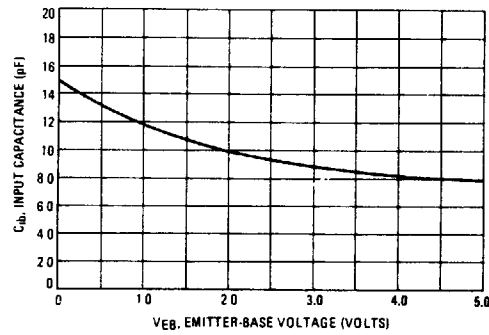


FIGURE 2 - INPUT CAPACITANCE



2

FIGURE 3 - OUTPUT CAPACITANCE

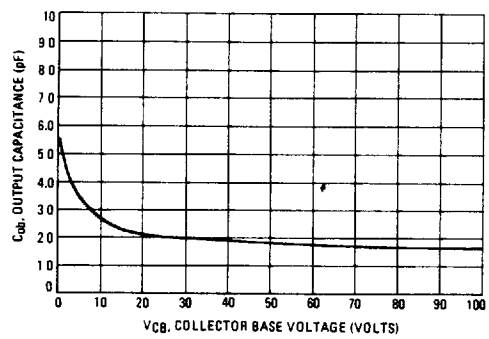
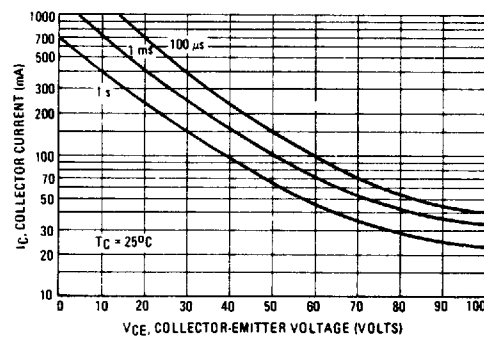


FIGURE 4 - DC SAFE OPERATING AREA



MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

T-33-05

MRF534
MRF536
 (See MM4049)

The RF Line

NPN Silicon
High Frequency Transistors

2

... designed primarily for high frequency common base amplifiers used in medium and high resolution color video display monitors.

- High Collector-Base Breakdown Voltage $V_{(BR)CBO} = 120$ V (Min)
- Stripline Opposed Base Construction
- Common Base Insertion Gain = 5.5 dB (Typ)
- Package Options for Low Cost (MRF542), High Power Dissipation (MRF548)
- Die Source Same as MRF544
- Emitter Ballasted for Improved Ruggedness

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	70	Vdc
Collector-Base Voltage	V_{CBO}	120	Vdc
Emitter-Base Voltage	V_{EBO}	3	Vdc
Collector-Current — Continuous	I_C	400	mA dc
Operating Junction Temperature	T_J	150 200	°C °C
Total Device Dissipation (at $T_C = 75^\circ\text{C}$ (1,2))	P_D	3 5 40	Watts mW/°C
Derate above 75°C			
Storage Temperature Range	T_{stg}	-65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	25	°C/W

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C = 1$ mA dc, $I_E = 0$)	$V_{(BR)CEO}$	70	—	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 0.1$ mA dc, $I_E = 0$)	$V_{(BR)CBO}$	120	—	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 0.1$ mA dc, $I_C = 0$)	$V_{(BR)EBO}$	3	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 80$ Vdc, $V_{BE} = 0$, $T_C = 25^\circ\text{C}$)	I_{CES}	—	—	100	μA dc
Collector Cutoff Current ($V_{CB} = 80$ Vdc, $I_E = 0$)	I_{CBO}	—	—	20	μA dc

ON CHARACTERISTICS

DC Current Gain ($I_C = 50$ mA dc, $V_{CE} = 10$ Vdc)	h_{FE}	15	—	—	—
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DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1$ MHz)	C_{ob}	—	2.9	—	pF
Collector-Base Capacitance ($V_{CB} = 10$ Vdc, $I_E = 0$, $f = 1$ MHz)	C_{cb}	—	2	2.5	pF
Input Capacitance ($V_{EB} = 3$ Vdc, $f = 1$ MHz)	C_{ib}	—	12.5	—	pF

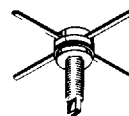
FUNCTIONAL TESTS

Common Base Gain ($V_{CB} = 10$ V, $I_C = 100$ mA, $f = 250$ MHz)	$ S_{21} ^2$	4.5	5.5	—	dB
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(1) T_C , Case temperature measured on collector lead immediately adjacent to body of package

(2) The MRF542 PowerMacro must be properly mounted for reliable operation. AN938, "Mounting Techniques in PowerMacro Transistor," discusses methods of mounting and heatsinking

MRF542
MRF548
HIGH FREQUENCY
TRANSISTORS
NPN SILICON

MRF542
CASE 317D-02, STYLE 3
PLASTIC

MRF548
CASE 244A-01, STYLE 3
(TO-117)
CERAMIC

MRF542, MRF548

MOTOROLA SC (XSTRS/R F) 46E D 6367254 0094741 2 M0T6

T-33-05

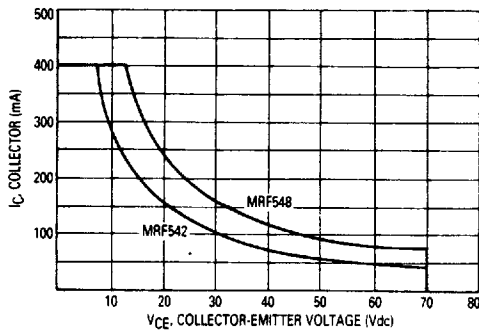


Figure 1. Safe Operating Area

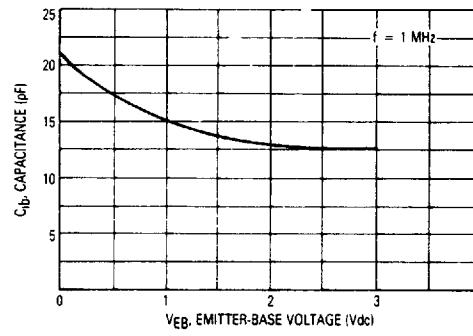


Figure 2. Input Capacitance versus Voltage

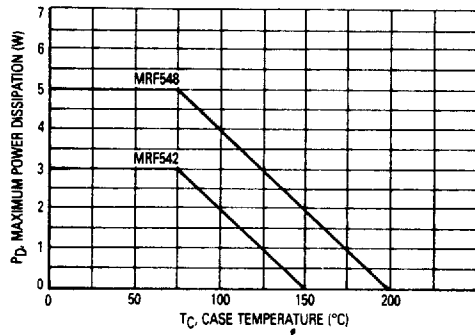


Figure 3. Power Dissipation versus Temperature

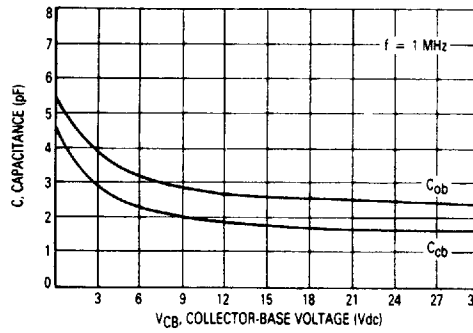


Figure 4. Junction Capacitance versus Voltage

2