1N5149
(MV1806C)

1N5150
(MV1807C)

Silicon high-frequency step-recovery power varactors for 100 MHz to 2.0 GHz harmonic-generation applications with output power to 25 watts at 1.0 GHz.

CASE 47

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating		Symbol	Value	Unit
Reverse Voltage		V_R	80	Vdc
Forward Current		I_F	1.0	Amp
RF Power Input	1N5149 1N5150	P_{in}	25 40	Watts
Total Device Dissipation @ T_A = 75°C	1N5149 1N5150	P_D	10 14	Watts
Derate above 75°C	1N5149 1N5150		0.08 0.11	W/°C
Junction Temperature		T_J	+200	°C
Storage Temperature Range		T_{stg}	-65 to +200	°C

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse Breakdown Voltage	BV_R	I_R = 10 μAdc	80	90	—	Vdc
Reverse Current	I_R	V_R = 70 Vdc	—	—	2	μAdc
		V_R = 70 Vdc, T_A = 150°C	—	—	100	
Diode Capacitance	C_T	V_R = 6 Vdc, f = 1.0 MHz	5	11.5	20	pF
Figure of Merit	Q	V_R = 6 Vdc, f = 50 MHz	—	800	—	—
Thermal Resistance	θ_{JC}	IN5150	—	—	9	°C/W

FUNCTIONAL TEST

1N5149

RF Power Output	P_{out}	Test Setup Figure 1 P_{in} = 20 W f_{in} = 0.5 GHz f_{out} = 1.0 GHz	11	—	—	Watts
Doubler Efficiency	η		55	—	—	%

1N5150

RF Power Output	P_{out}	Test Setup Figure 1 P_{in} = 37 W f_{in} = 0.5 GHz f_{out} = 1.0 GHz	24	25	—	Watts
Doubler Efficiency	η		65	68	—	%

FIGURE 1 — HARMONIC DOUBLER EFFICIENCY TEST CIRCUIT

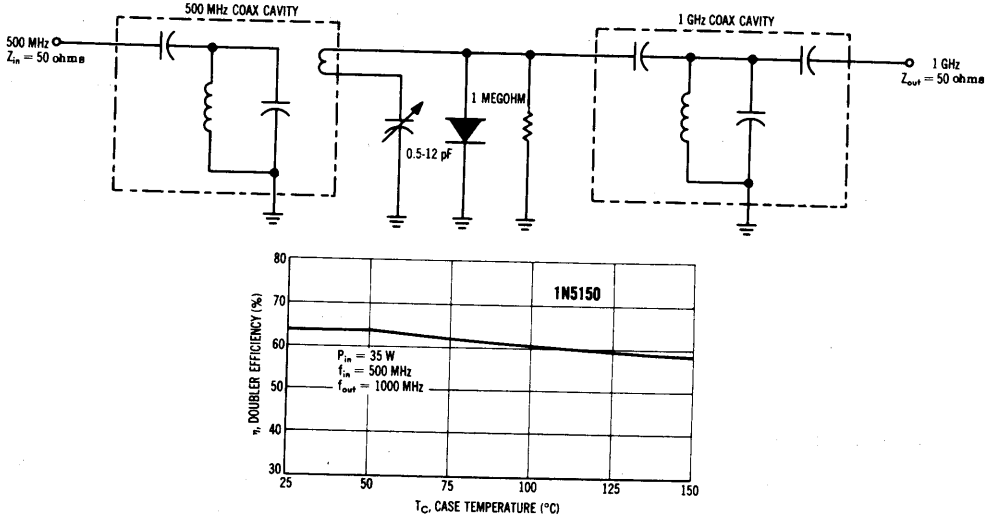


FIGURE 2 — LINEARITY CHARACTERISTIC WITHOUT RETUNING

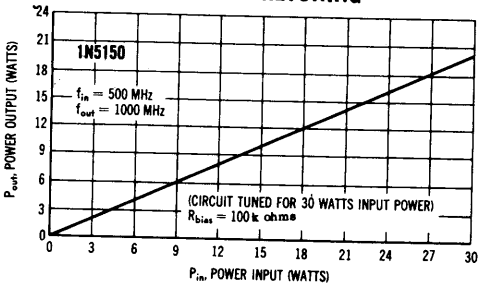
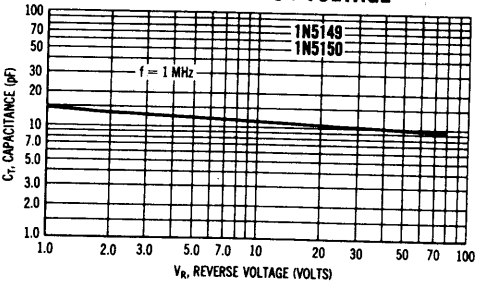


FIGURE 3 — CAPACITANCE versus REVERSE VOLTAGE



POWER OUTPUT versus OUTPUT FREQUENCY

1N5149

FIGURE 4A — DOUBLING (X2)

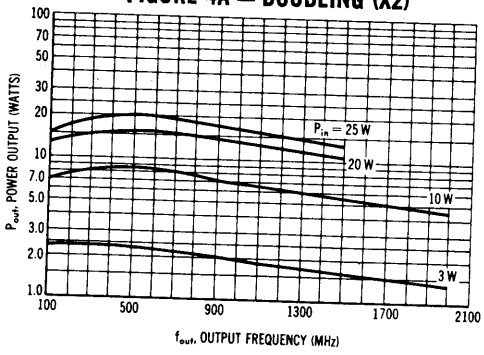


FIGURE 4B — TRIPLING (X3)

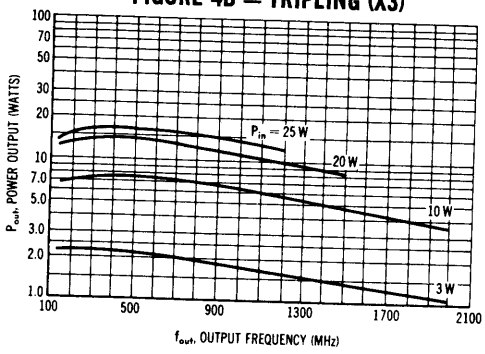
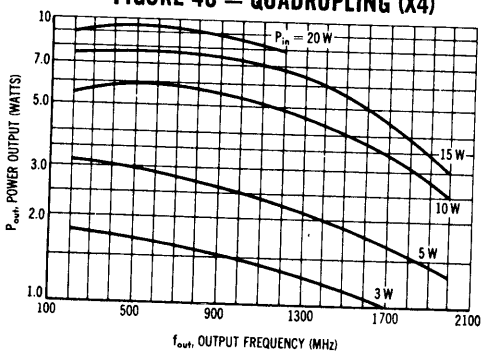


FIGURE 4C — QUADRUPLING (X4)



1N5150

FIGURE 5A — DOUBLING (X2)

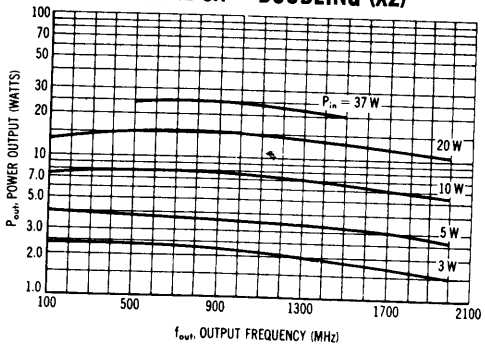


FIGURE 5B — TRIPLING (X3)

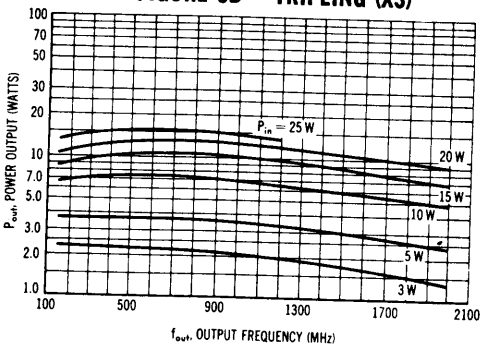
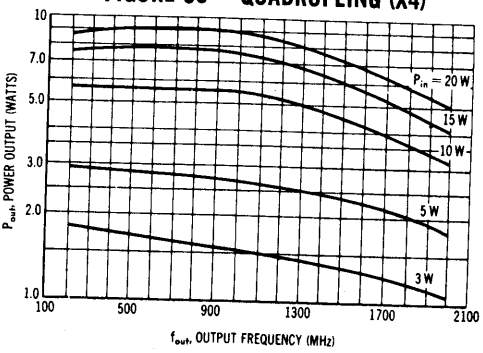
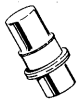


FIGURE 5C — QUADRUPLING (X4)



1N5150A (SILICON)
(MV1807C1)
1N5152A
(MV1808B1)
1N5153A
(MV1808C1)
1N5155A
(MV1810B1)

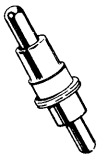
Silicon high-frequency step-recovery power varactor devices optimized for critical multiplier applications requiring tight control of junction capacitance and power dissipation.



CASE 46

1N5152A
MV1808B1

1N5155A
MV1810B1



CASE 47

1N5150A
MV1807C1

1N5153A
MV1808C1

MAXIMUM RATINGS

Rating	Symbol	1N5150A	1N5152A	1N5153A	1N5155A	Unit
Reverse Voltage	V_R	80	75	75	35	Vdc
Forward Current	I_F	1000	250	250	200	mAdc
RF Power Input	P_{in}	40	15	15	7.0	Watts
Total Device Dissipation @ T_C = 25°C	P_D	29.2	11.7	11.7	8.75	Watts
Derate above 25°C		167	66.7	66.7	50	mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	← -65 to +200 →				°C

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

Characteristics		Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage (I_R = 10 μAdc)	1N5150A	BV_R	80	-	-	Vdc
	1N5152A, 1N5153A		75	-	-	
	1N5155A		35	-	-	
Reverse Current		I_R				μAdc
(V_R = 70 Vdc)	1N5150A		-	-	2.0	
(V_R = 70 Vdc, T_A = 150°C)	1N5150A		-	-	100	
(V_R = 60 Vdc)	1N5152A, 1N5153A		-	-	1.0	
(V_R = 60 Vdc, T_A = 150°C)	1N5152A, 1N5153A		-	-	100	
(V_R = 26 Vdc)	1N5155A		-	-	1.0	
(V_R = 26 Vdc, T_A = 150°C)	1N5155A		-	-	100	
Series Resistance		R_S				Ohms
(V_R = 6.0 Vdc, f = self-resonant frequency)	1N5150A		-	0.25	-	
	1N5152A, 1N5153A		-	0.5	-	
	1N5155A		-	0.9	-	
Series Inductance		L_S				nH
	1N5150A		-	1.5	-	
	1N5152A		-	0.8	-	
	1N5153A		-	1.7	-	
	1N5155A		-	0.9	-	
Diode Capacitance (C_J + C_C)		C_T				pF
(V_R = 6.0 Vdc, f = 1.0 MHz)	1N5150A		10.8	-	13.2	
	1N5152A		5.4	-	6.6	
	1N5153A		5.8	-	7.0	
	1N5155A		1.71	-	2.09	
Figure of Merit		Q				-
(V_R = 6.0 Vdc, f = 50 MHz)	1N5150A		-	800	-	
	1N5152A, 1N5153A		-	1100	-	
	1N5155A		-	1700	-	
Thermal Resistance		θ_{JC}				°C/W
	1N5150A		-	-	6.0	
	1N5152A, 1N5153A		-	-	15	
	1N5155A		-	-	20	

FUNCTIONAL TEST

1N5150A

RF Power Output	P_{in} = 37 W, f_{in} = 500 MHz,	P_{out}	25.1	-	-	Watts
Doubling Efficiency	f_{out} = 1.0 GHz	η	68	-	-	%

1N5152A, 1N5153A

RF Power Output	P_{in} = 12 W, f_{in} = 1.0 GHz,	P_{out}	7.2	-	-	Watts
Doubling Efficiency	f_{out} = 2.0 GHz	η	60	-	-	%

1N5155A

RF Power Output	P_{in} = 5.0 W, f_{in} = 2.0 GHz,	P_{out}	2.0	-	-	Watts
Tripling Efficiency	f_{out} = 6.0 GHz	η	40	-	-	%

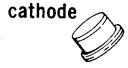
For typical curves and test circuits, see the following data sheets: 1N5149-1N5150, 1N5151 thru 1N5153, and 1N5154-1N5155.

1N5151
(MV1808A)

1N5152
(MV1808B)

1N5153
(MV1808C)

Silicon high-frequency step-recovery power varactors, designed for high-power, high-frequency harmonic generation applications.



CASE 48
(1N5151)
(pill)

CASE 46
(1N5152)
(pill with prongs)

CASE 47
(1N5153)
(cartridge)

MAXIMUM RATINGS ($T_A = 25°C$ unless otherwise noted)

Rating	Symbol	Value	Unit
Reverse Voltage	V_R	75	Vdc
Forward Current	I_F	0.25	Adc
RF Power Input	P_{in}	15	Watts
Total Device Dissipation @ $T_C = 75°C$ Derate above 75°C	P_D	5.5 45	Watts mW/°C
Junction Temperature	T_J	+200	°C
Storage Temperature	T_{stg}	-65 to +200	°C

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

Characteristic	Condition	Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage	I_R = 10 μAdc	BV_R	75	80	–	Vdc
Reverse Current	V_R = 60 Vdc V_R = 60 Vdc, T_A = 150°C	I_R	– –	0.5 –	1 100	μAdc
Series Resistance	V_R = 6 Vdc, f = 50 MHz	R_S	–	0.5	–	Ohms
Diode Capacitance	V_R = 6 Vdc, f = 1.0 MHz V_R = 70 Vdc, f = 1.0 MHz	C_T*	5.0 –	5.8 4	7.5 –	pF
Figure of Merit	V_R = 6 Vdc, f = 50 MHz	Q	–	1100	–	–
Power Output	DOUBLER TEST CIRCUIT (Figure 1) P_{in} = 12 W, f_{in} = 1GHz f_{out} = 2 GHz	P_{out}	6.0	7.2	–	Watts
Efficiency		η	50	60	–	%
Thermal Resistance		θ_J	–	19	23	°C/Watt

*$C_T = C_J + C_C$

FIGURE 1 — HARMONIC DOUBLER EFFICIENCY TEST CIRCUIT

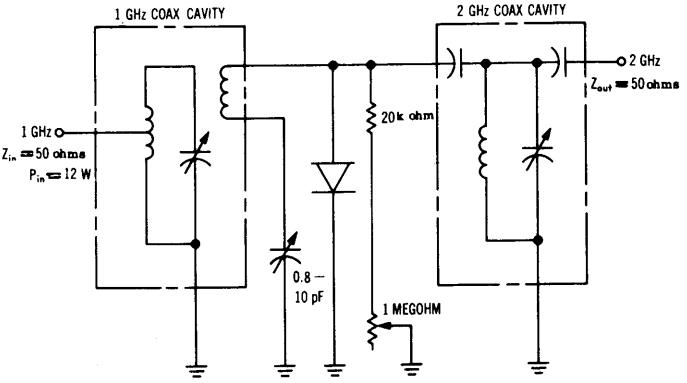
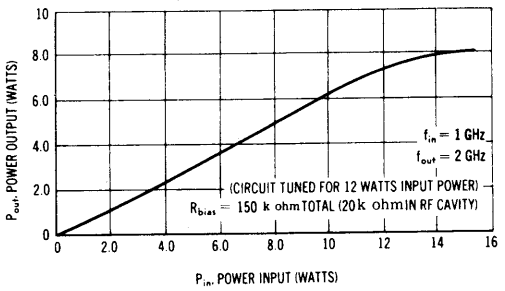


FIGURE 2 — LINEARITY CHARACTERISTIC WITHOUT RETUNING



POWER OUTPUT
versus OUTPUT FREQUENCY

FIGURE 3A — DOUBLING (X2)

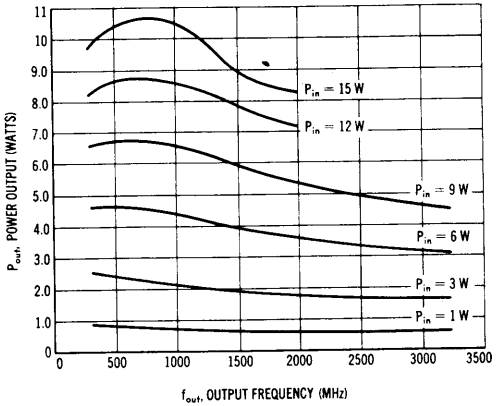


FIGURE 3B — TRIPLING (X3)

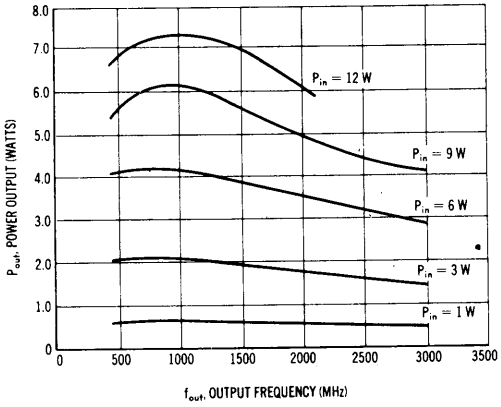
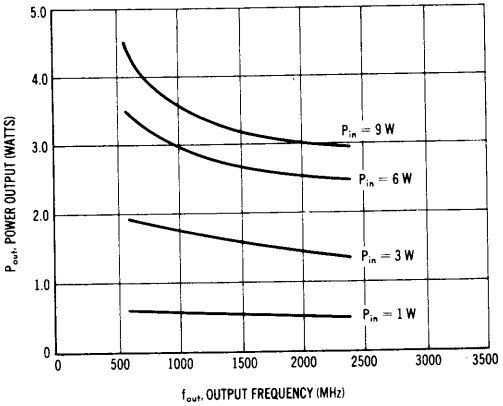


FIGURE 3C — QUADRUPLING (X4)



TYPICAL CHARACTERISTICS at 25°C

FIGURE 4 — FIGURE OF MERIT versus REVERSE VOLTAGE

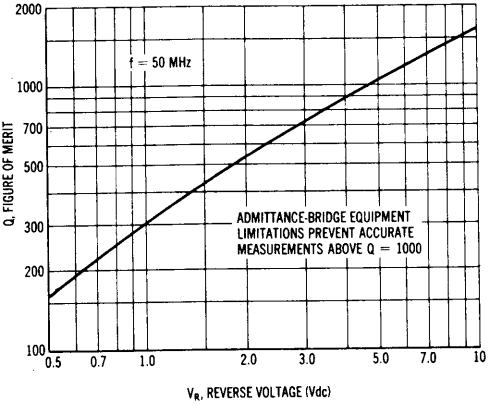


FIGURE 5 — VARACTOR CAPACITANCE versus REVERSE VOLTAGE

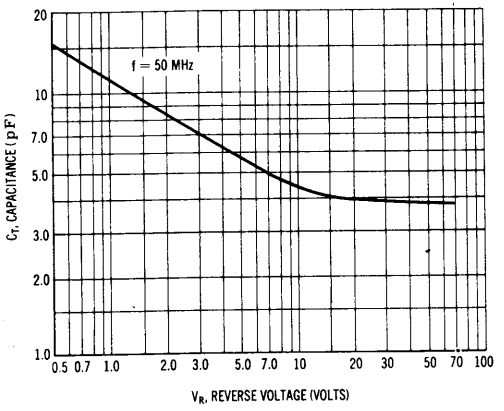
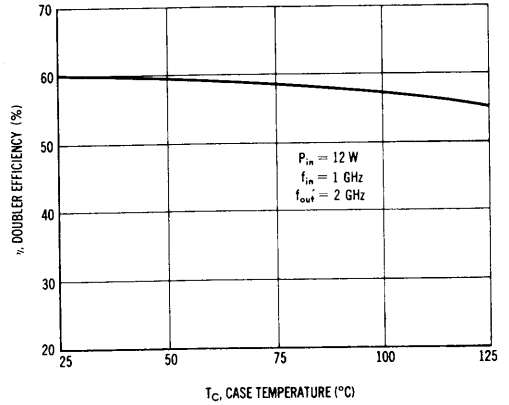


FIGURE 6 — DOUBLER EFFICIENCY versus CASE TEMPERATURE



1N5154
(MV1810A)
1N5155
(MV1810B)

CASE 48
(1N5154)
(pill)

CASE 46
(1N5155)
(pill with prongs)

Silicon high-frequency step-recovery power varactors, for multiplier applications from 2 to 8.5 GHz with 2 watts minimum power output guaranteed at 6 GHz.

MAXIMUM RATINGS ($T_C = 25°C$ unless otherwise noted)

Rating	Symbol	Value	Unit
Reverse Voltage	V_R	35	Vdc
Forward Current	I_F	200	mAdc
RF Power Input	P_{in}	7	Watts
Total Device Dissipation @ T_C = 75°C Derate above 75°C	P_D	3.5 30	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage	I_R = 10 μAdc	BV_R	35	45	—	Vdc
Reverse Current	V_R = 26 Vdc V_R = 26 Vdc, T_A = 150°C	I_R	— —	— —	1 100	μAdc
Series Resistance	V_R = 6 Vdc, f = 50 MHz	R_S	—	0.9	—	Ohms
Diode Capacitance	V_R = 6 Vdc, f = 1 MHz	C_T	1.0	2.1	3.0	pF
Figure of Merit	V_R = 6 Vdc, f = 50 MHz	Q	—	1700	—	—
Thermal Resistance		θ_{JC}	—	—	35	°C/W

FUNCTIONAL TEST

RF Power Output	Test Circuit Figure 5 P_{in} = 5 watts, f_{in} = 2 GHz, f_{out} = 6 GHz	P_{out}	2	—	—	Watts
Tripling Efficiency		η	40	—	—	%

POWER OUTPUT versus OUTPUT FREQUENCY

FIGURE 1A — DOUBLING (X2)

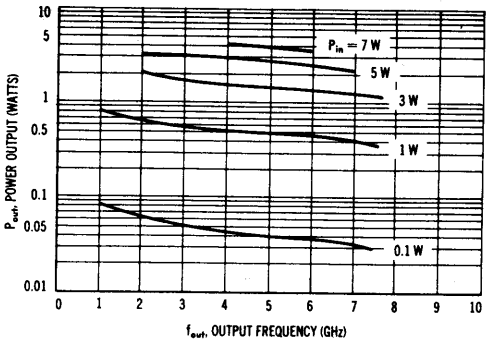


FIGURE 1B — TRIPLING (X3)

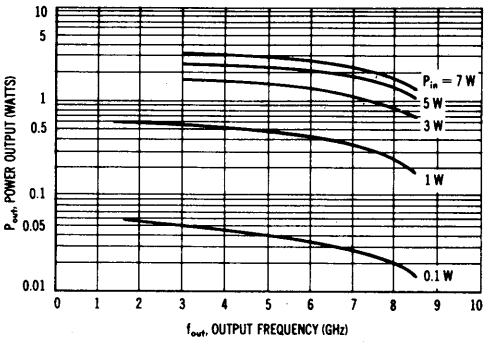
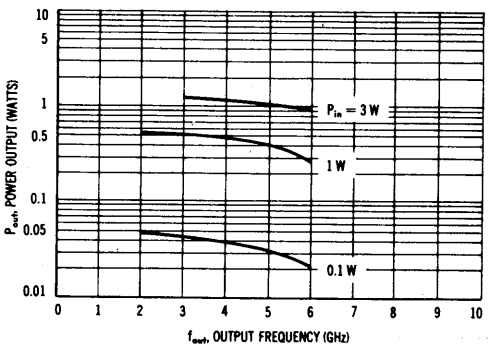


FIGURE 1C — QUADRUPLING (X4)



TYPICAL CHARACTERISTICS $T_C = 25°C$

FIGURE 2 — VARACTOR CAPACITANCE versus REVERSE VOLTAGE

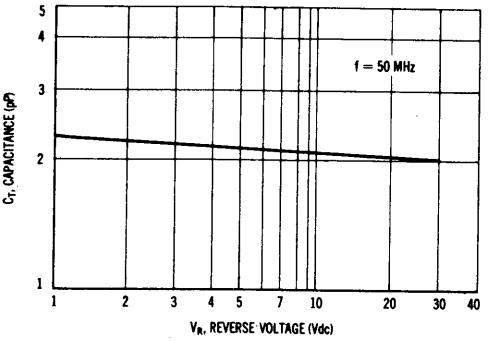


FIGURE 3 — TRIPLER POWER OUTPUT versus TEMPERATURE 2 GHz to 6 GHz

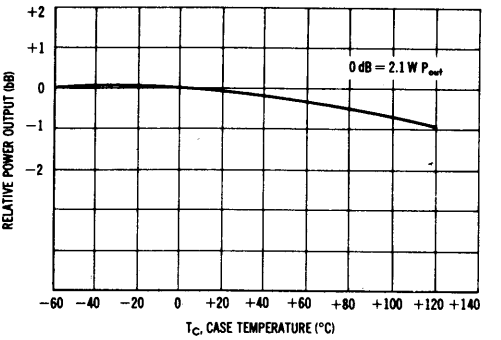


FIGURE 4 — TRIPLER LINEARITY CHARACTERISTIC

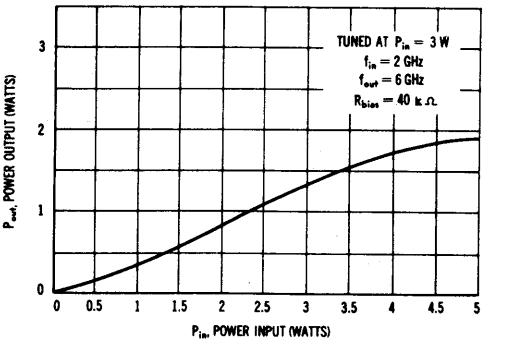


FIGURE 5 – HARMONIC TRIPLER – 2 GHz to 6 GHz

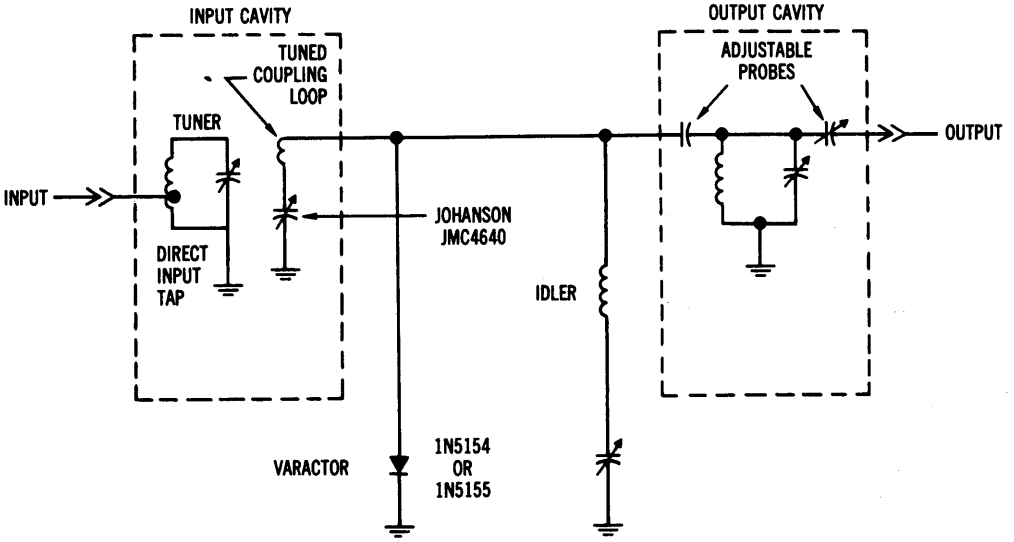
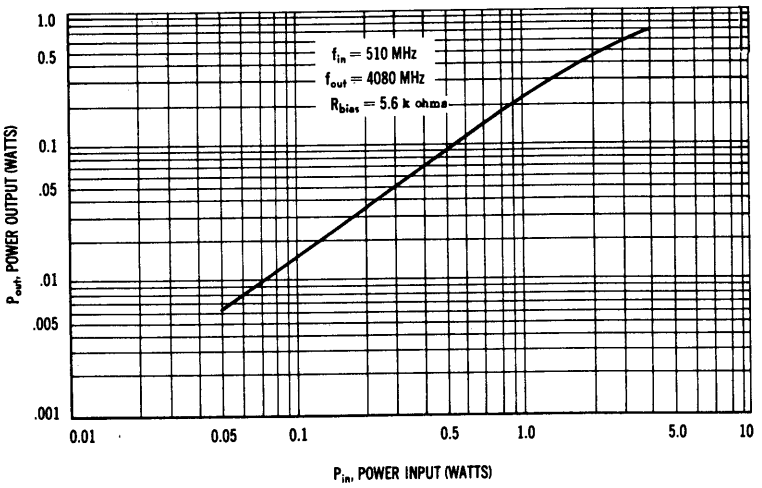
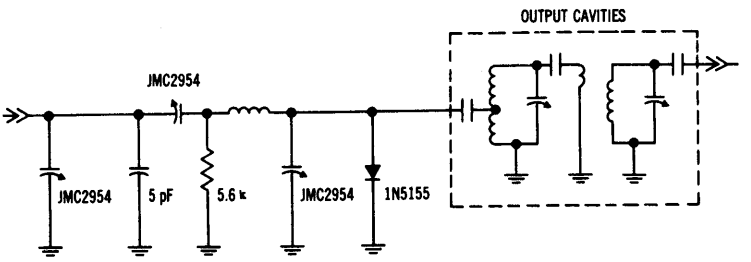


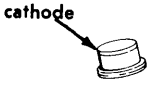
FIGURE 6 – HARMONIC OCTUPLER – 510 MHz to 4080 MHz





IN5156
(MV1812A)
IN5157
(MV1812B)

CASE 46



CASE 48

AVAILABLE IN PILL PACKAGE ON SPECIAL REQUEST

Silicon high-frequency step-recovery power varactors; epitaxial-passivated devices designed for multiplier applications from 1.0 to 13 GHz with 1.0 W minimum power output guaranteed at 10 GHz.

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Reverse Voltage	V_R	20	Vdc
Forward Current	I_F	160	mAdc
RF Power Input	P_{in}	5.0	Watts
Total Device Dissipation @ T_C = 75°C Derate above 75°C	P_D	3.25 26	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Characteristic	Conditions	Symbol	Min	Typ	Max	Unit
Reverse Breakdown Voltage	I_R = 10 μAdc	BV_R	20	–	–	Vdc
Reverse Current	V_R = 16 Vdc	I_R	–	–	0.1	μAdc
	V_R = 16 Vdc, T_A = 150°C		–	–	100	
Series Resistance	V_R = 6.0 Vdc, f = 50 MHz	R_S	–	1.1	–	Ohms
Diode Capacitance	V_R = 6.0 Vdc, f = 1.0 MHz	C_T	0.6	–	1.0	pF
Figure of Merit	V_R = 6.0 Vdc, f = 50 MHz	Q	–	3600	–	–
Thermal Resistance		θ_{JC}	–	–	38.5	°C/W

FUNCTIONAL TEST

RF Power Output	P_{in} = 2.6 W , f_{in} = 5.0 GHz	P_{out}	1.0	–	–	Watt
Doubling Efficiency	f_{out} = 10 GHz	η	38.5	–	–	%