RF Products

In Brief . . .

While Motorola is considered to be the supermarket for semiconductor products, there is not a category in which the selection is more diverse, or more complete, than in products designed for RF system applications. From MOS, bipolar power and signal transistors to integrated circuits, Motorola's RF components cover the entire spectrum from HF to microwave to personal communications. Yet, product expansion continues — not only to keep pace with the progressive needs of the industry, but to better serve the needs of designers for a reliable and comprehensive source of supply.

How to Use This Selector Guide

This new selector guide combines the RF products of Motorola Phoenix, Motorola Toulouse (France), and Motorola Hong Kong. The products in this guide are separated FIRST into major categories such as Power FETs, Power Bipolar, Small Signal, Monolithic Integrated Circuits, and Low and High Power Amplifiers. SECOND, within each category parts are listed by frequency band, except for small signal transistors and monolithic integrated circuits, which are divided by application. Small signal transistor applications are low noise, linear amplifiers, switches, and oscillators. Monolithic integrated circuit application groupings are switching, receiver functions and transmitter functions. THIRD, within a frequency band, transistors are further grouped by operating voltage and, finally, output power.

Remember

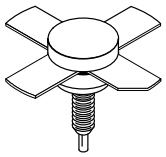
Applications assistance is only a phone call away — call the nearest Semiconductor Sales office or 1-800-521-6274.

RF Discrete Transistors

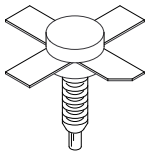
In the following pages, the reader will find the most extensive group of RF Discrete Transistors offered by any semiconductor manufacturer anywhere in the world today.

From Bipolar to FET, from Low Power to High Power, the user can choose from a variety of packages. They include plastic, metal can and ceramic that are microstrip circuit compatible or surface mountable. Many are designed for automated assembly equipment.

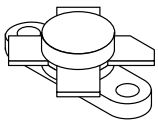
Major sub–headings are MOSFETs, Power Bipolar and Small Signal.



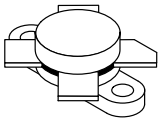
CASE 145A–09
STYLE 1
(.380″ STUD)



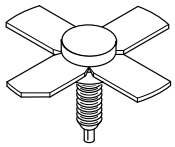
CASE 145D–02
STYLE 1
(.380″ SOE)



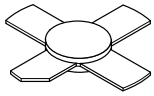
CASE 211–07
STYLE 1, 2
(.380″ FLANGE)



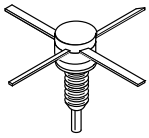
CASE 211–11
STYLE 1, 2
(.500″ FLANGE)



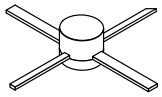
CASE 244
STYLE 1
(.280″ STUD)



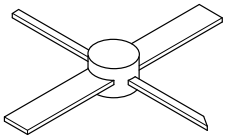
CASE 249
STYLE 1, 3
(.280″ PILL)



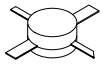
CASE 305
STYLE 1
(.204″ STUD)



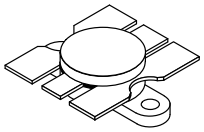
CASE 305A
STYLE 1, 2
(.204″ PILL)



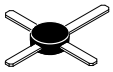
CASE 305C
STYLE 1



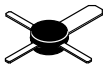
CASE 305D
STYLE 1



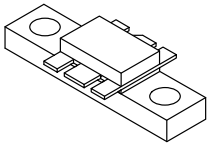
CASE 316–01
STYLE 1, 3
(.500″ CQ)



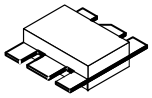
CASE 317
STYLE 1, 2
(MACRO–X)



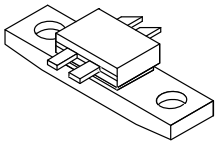
CASE 317D
STYLE 2



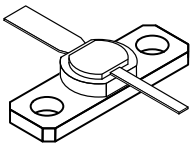
CASE 319
STYLE 1, 2, 3
(CS–12)



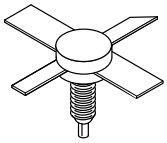
CASE 319A
STYLE 2



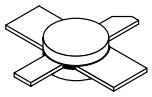
CASE 319B
STYLE 1



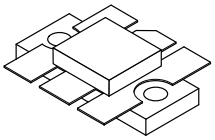
CASE 328A–03
STYLE 1



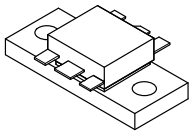
CASE 332–04
STYLE 1, 2
(.280″ STUD)



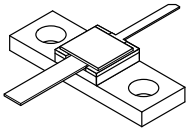
CASE 332A
STYLE 2
(.280″ PILL)



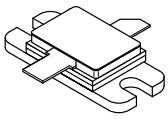
CASE 333
STYLE 1



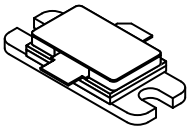
CASE 333A
STYLE 1, 2
(MAAC PAC)



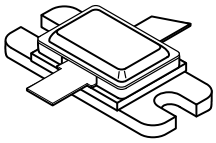
CASE 336E
STYLE 1



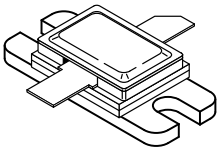
CASE 355C
STYLE 1



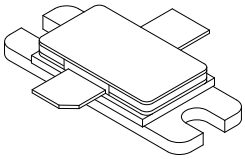
CASE 355D
STYLE 1



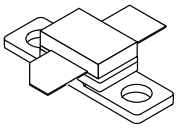
CASE 355E
STYLE 1



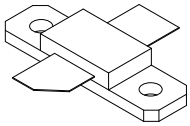
CASE 355G
STYLE 1



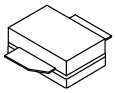
CASE 355H–01
STYLE 1



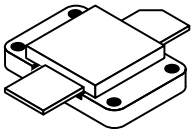
CASE 360A
STYLE 2



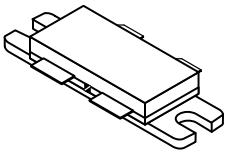
CASE 360B
STYLE 1
(Micro 250)



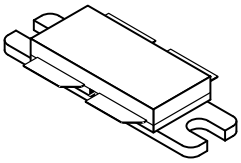
CASE 360C
STYLE 1
(Viper)



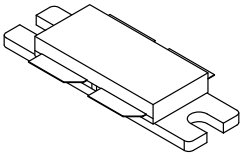
CASE 368
STYLE 2
(HOG PAC)



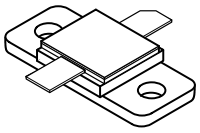
CASE 375
STYLE 2



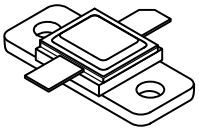
CASE 375A
STYLE 1



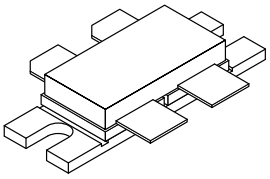
CASE 375B
STYLE 2
(Micro 860)



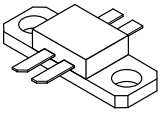
CASE 376B
STYLE 1



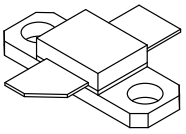
CASE 376C
STYLE 1



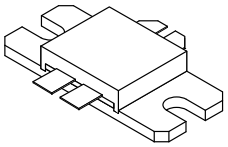
CASE 390B
STYLE 1



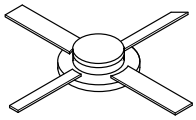
CASE 395B
STYLE 1



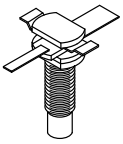
CASE 395C
STYLE 1, 2



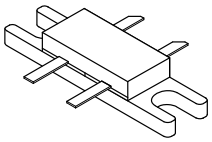
CASE 398
STYLE 1



CASE 400
STYLE 1

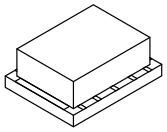


CASE 401
STYLE 1

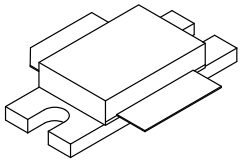


CASE 412
STYLE 1

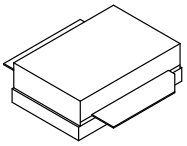
CASE 430
STYLE 2



CASE 430B
STYLE 1

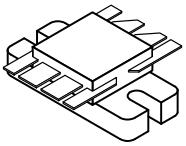


CASE 451
STYLE 1



CASE 451A
STYLE 1

CASE 458
STYLE 1



CASE 744A
STYLE 1, 2

CASE 751
STYLE 1
(SO–8)

RF Power MOSFETs

Motorola RF Power MOSFETs are constructed using a planar process to enhance manufacturing repeatability. They are *N–channel field effect transistors* with an oxide insulated gate which controls vertical current flow.

Compared with bipolar transistors, RF Power FETs exhibit higher gain, higher input impedance, enhanced thermal stability and lower noise. The FETs listed in this section are specified for operation in RF Power Amplifiers and are grouped by frequency range of operation and type of application. Arrangement within each group is first by order of voltage then by increasing output power.

Table 1. To 54 MHz

Designed for broadband HF & VHF commercial and industrial applications. The high gain and broadband performance of this device makes it ideal for large–signal, common–source amplifier applications in 12.5 volt mobile and base station operation.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} (Typ)/Freq. dB/MHz	η Eff., Typ %	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 Volts, Class AB						
MRF255★	55	0.8	16/54	45	1.0	211–11/2

Table 2. To 150 MHz HF/SSB

For military and commercial HF/SSB fixed, mobile and marine transmitters.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} Typical Gain dB @ 30 MHz	Typical IMD		θ_{JC} °C/W	Package/Style
				d_3 dB	d_{11} dB		
V_{DD} = 28 Volts, Class AB							
MRF138	30	0.6	17	–30	–60	1.5	211–07/2
MRF140	150	4.7	15	–30	–60	0.6	211–11/2
V_{DD} = 50 Volts, Class AB							
MRF148	30	0.5	18	–35	–60	1.5	211–07/2
MRF150	150	3	17	–32	–60	0.6	211–11/2
MRF154	600	12	17	–25	—	0.13	368/2
MRF157	600	6	20	–25	—	0.13	368/2

Table 3. To 225 MHz VHF AM/FM

For VHF military and commercial aircraft radio transmitters.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} (Typ)/Freq. dB/MHz	η Efficiency Typical %	θ_{JC} °C/W	Package/Style
V_{DD} = 28 Volts, Class AB						
MRF134	5	0.2	14/150	55	10	211–07/2
MRF136	15	0.38	16/150	60	3.2	211–07/2
MRF136Y	30	1.2	14/150	54	1.8	319B/1
MRF137	30	0.75	16/150	60	1.8	211–07/2
MRF173	80	4	13/150	65	0.8	211–11/2
MRF175LV	100	4	14/225	65	0.65	333/1
MRF174	125	8.3	11.8/150	60	0.65	211–11/2
MRF141	150	15	10/175	55	0.6	211–11/2
MRF175GV	200	8	14/225	65	0.44	375/2
MRF141G	300	30	10/175	55	0.35	375/2
V_{DD} = 50 Volts, Class AB						
MRF151	150	7.5	13/175	45	0.6	211–11/2
MRF176GV	200	4	17/225	55	0.44	375/2
MRF151G	300	7.5	16/175	55	0.35	375/2

★ New Product

Table 4. To 500 MHz VHF/UHF AM/FM

For VHF/UHF military and commercial aircraft radio transmitters.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} (Typ)/Freq. dB/MHz	η Eff., Typ %	θ_{JC} °C/W	Package/Style
V_{DD} = 28 Volts, Class AB						
MRF158	2	0.02	20/400	55	13.2	305A/2
MRF160	4	0.08	17/400	50	7.2	249/3
MRF166C	20	0.4	17/400	55	2.5	319/3
MRF164W	20	0.4	16.5/400	50	1.5	412/1
MRF166W	40	2	13/400	50	1.0	412/1
MRF175LU	100	10	10/400	55	0.65	333/1
MRF177	100	6.4	12/400	60	0.65	744A/2
MRF177M	100	6.4	12/400	60	0.65	390B/1
MRF175GU	150	9.5	12/400	55	0.44	375/2
V_{DD} = 50 Volts, Class AB						
MRF176GU	150	6	14/400	50	0.44	375/2

Table 5. To 520 MHz

Designed for broadband VHF & UHF commercial and industrial applications. The high gain and broadband performance of these devices make them ideal for large–signal, common–source amplifier applications in 12.5 volt mobile and base station operation.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} (Typ)/Freq. dB/MHz	η Eff., Typ %	θ_{JC} °C/W	Package/Style
V_{CC} = 7.5 Volts, Class AB						
MRF5003[18a]	3	0.27	10.5/512	50	14	430/2
MRF5007[18a] ★	7	0.5	11.5/512	55	5	430B/1
V_{CC} = 12.5 Volts, Class AB						
MRF5015	15	1.1	11.5/512	55	3.5	319/3
MRF5035	35	6.3	7.5/512	55	1.8	316–01/3

Table 6. To 1.0 GHz

For HF/VHF/UHF military and commercial radio transmitters.

Device	P_{out} Output Power Watts	P_{in} Input Power Typical Watts	G_{ps} (Typ)/Freq. dB/MHz	η Eff., Typ %	θ_{JC} °C/W	Package/Style
V_{DD} = 28 Volts, Class AB						
MRF181[46]	4	0.15	14/1000	55	4.7	458/1
MRF182	30	1.2	14/1000	55	1.5	360B/1
MRF182S ★	30	1.2	14/1000	55	1.5	360C/1
MRF183	45	1.8	14/1000	55	1.25	360B/1
MRF183S ★	45	1.8	14/1000	55	1.25	360C/1
MRF184[46]	60	1.9	15/1000	55	1.1	360B/1
MRF185[3,46b]	85	3.4	14/1000	55	0.7	375B/2

[3] Internal Impedance Matched Push-Pull Transistors

[18] Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.

[46] To be introduced 2nd half of 1996.

★ New Product

RF Power Bipolar Transistors

Motorola's broad line of bipolar RF power transistors are characterized for operation in RF power amplifiers. Typical applications are in military and commercial landmobile, avionics and marine radio transmitters. Groupings are by frequency band and type of application. Within each group, the arrangement of devices is by major supply voltage rating, then in the order of increasing output power. All devices are NPN polarity except where otherwise noted.

HF Transistors

Table 1. 1.5 – 30 MHz, HF/SSB

Designed for broadband operation, these devices feature specified Intermodulation Distortion at rated power output. Applications include mobile, marine, fixed station, and amateur HF/SSB equipment, operating from 12.5, 13.6, 28, or 50 volt supplies.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min) Gain @ 30 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 or 13.6 Volts, Class AB					
MRF421	100 PEP/CW	10	10	0.6	211–11/1
V_{CC} = 28 Volts, Class AB					
MRF426	25 PEP/CW	0.16	22	2.5	211–07/1
MRF422	150 PEP/CW	15	10	0.6	211–11/1
V_{CC} = 50 Volts, Class AB					
MRF429	150 PEP/CW	7.5	13	0.8	211–11/1
MRF448	250 PEP/CW	15.7	12	0.6	211–11/1

Table 2. 14 – 30 MHz, CB/Amateur Band

These HF transistors are designed for economical, high–volume use in CW, AM and SSB applications.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min) Gain @ 50 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 or 13.6 Volts, Class AB					
MRF455	60	3	13	1	211–07/1
MRF454	80	5	12	0.7	211–11/1

Table 3. 27 – 50 MHz, Low–Band FM Band

For use in the FM "Low–Band," for Mobile communications.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min) Gain @ 50 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 or 13.6 Volts, Class AB					
MRF492	70	5.6	11	0.7	211–11/1

VHF Transistors

Table 4. 30 – 200 MHz Band

Designed for Military Radio and Commercial Aircraft VHF bands, these 28–volt devices include the all–gold metallized MRF314/16/17 high–reliability series.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts, Class AB					
MRF314	30	3	10/150	2.2	211–07/1
MRF316(2)	80	8	10/150	0.8	316–01/1
MRF317(2)	100	12.5	9/150	0.65	316–01/1

(2)Internal Impedance Matched

Table 5. 136 – 174 MHz High Band

The “workhorse” VHF FM High–Band is served by Motorola with the broadest range of devices and package combinations in the industry.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min) Gain @ 175 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 Volts, Class C					
MRF4427(18b)	1	0.016	18(19)	125(1)	751/1
MRF553	1.5	0.11	11.5	25	317D/2
MRF2628	15	0.95	12	4	244/1
MRF1946	30	3	10	1.6	211–07/1
MRF1946A	30	3	10	1.8	145A–09/1
MRF224	40	14.3	4.5	2.2	211–07/1
MRF240	40	5	9	2.2	145A–09/1
MRF247(2)	75	15	7	0.7	316–01/1

UHF Transistors

Table 6. 100 – 400 MHz Band

Stringent requirements of the UHF Military band are met by MRF325, 326, 327, 329 and 2N6439 types, with all–gold metal systems, specified ruggedness and programmed wirebond construction, to assure consistent input impedances for internally matched parts.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min) Gain @ 400 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts, Class C					
MRF325(2)	30	4.3	8.5	2.2	316–01/1
MRF326(2)	40	5	9	1.6	316–01/1
2N6439(2)	60	10	7.8	1.2	316–01/1
MRF327(2)	80	14.9	7.3	0.7	316–01/1
MRF329(2)	100	20	7	0.7	333/1
MRF392(3)	125	19.8	8	0.7	744A/1

Table 7. 400 – 500 MHz Band

Similar to the 100–400 MHz transistors, these devices have bandwidth capabilities operating up to 500 MHz. All have nitride passivated die, gold metal systems, specified ruggedness and controlled wirebond construction to meet the stringent requirements of military space applications.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts, Class C					
MRF313	1	0.03	15/400	28.5	305A/1
MRF321	10	0.62	12/400	6.4	244/1
MRF323	20	2	10/400	3.2	244/1
MRF393(3)	100	18	7.5/500	0.7	744A/1

(1)$R_{\theta JA}$. Thermal Resistance Junction to Ambient.
(2)Internal Impedance Matched
(3)Internal Impedance Matched Push-Pull Transistors
(18)Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
(19)Typical

UHF Transistors (continued)

Table 8. 470 – 512 MHz Band

Higher power output devices in this UHF power transistor series feature internally input–matched construction, are designed for broadband operation, and have guaranteed ruggedness under output mismatch and RF overdrive conditions. Devices are specified for handheld, mobile and base station operation.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 Volts, Class C					
MRF581(4)	0.6	0.03	13/500	40	317/2
MRF555	1.5	0.15	10/470	25	317D/2
MRF652	5	0.5	10/512	7	244/1
MRF652S	5	0.5	10/512	7	249/1
MRF653	10	2	7/512	4	244/1
MRF653S	10	2	7/512	4	249/1
MRF641(2)	15	2.5	7.8/470	4	316–01/1
MRF654(2)	15	2.5	7.8/512	4	244/1
MRF644(2)	25	5.9	6.2/470	1.7	316–01/1
MRF650(2)	50	15.8	5.0/512	1.3	316–01/1
MRF658(2)	65	25	4.15/512	1	316–01/1

Device	P_{out} Output Power Watts	Class	P_{in} (Max) Input Power Watts	G_{PE} (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 24 Volts						
TP5002S	1.5	A	0.075	13/470	21	249/1
TP5015	15	AB	1.2	11/470	7.0	319/2
TP5051	50	AB	6	9/470	1.2	333A/2

900 MHz Transistors

Table 9. 870 – 960 MHz Band

Designed specifically for the 900 MHz mobile radio band, MRF840 through MRF847 devices offer superior gain and ruggedness, using the unique CS–12 package, which minimizes common–element impedance, and thus maximizes gain and stability. Devices are listed for mobile and base station applications.

Device	P_{out} Output Power Watts	P_{in} (Max) Input Power Watts	G_{PE} (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 12.5 Volts — Class C — Si Bipolar					
MRF559(5)	0.5	0.08	8/870	50	317/2
MRF581(5)	0.6	0.06	10(19)/870	40	317/2
MRF837(5)	0.75	0.11	8/870	40	317/1
MRF8372(5)(18a,b)	0.75	0.11	8/870	45	751/1
MRF557(5)	1.5	0.23	8/870	25	317D/2
MRF839F(5)	3	0.46	8/870	9	319/2
MRF840(2)(6)	10	2.5	6/870	3.1	319/1
MRF842(2)(6)	20	5	6/870	1.5	319/1
MRF844(2)(6)	30	9	5.2/870	1.5	319/1
MRF847(2)(6)	45	16	4.5/870	1	319/1

(2)Internal Impedance Matched

(4)Small signal gain. P_O is Typ.

(5)Common Emitter Configuration

(6)Common Base Configuration

(18)Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.

(19)Typical

Table 9. 870 – 960 MHz Band (continued)

Device	P_{out} Output Power Watts	Class	P_{in}(Max) Input Power Watts	Gp (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 24 Volts — Si Bipolar						
MRF890	2	C	0.25	9/900	25	305/1
TP3007S	2	AB	0.25	9/960	21	305C/1
MRF857	2.1 (CW)	A	0.4	12.5/900	8.4	305/1
MRF857S	2.1 (CW)	A	0.4	12.5/900	8.4	305D/1
MRF896	3	AB	0.3	10/900	7	305/1
MRF858	3.6 (CW)	A	0.29	11/900	6.9	319/2
MRF858S	3.6 (CW)	A	0.29	11/900	6.9	319A/2
TP3008	4	AB	0.28	11.5/960	5	319/2
MRF891	5	AB	0.63	9/900	7	319/2
MRF891S	5	AB	0.63	9/900	7	319A/2
MRF859★	6.5 W (CW)	A	0.46	11.5/900	3.9	319/2
MRF859S★	6.5 W (CW)	A	0.46	11.5/900	3.9	319A/2
TP3021	10	AB	1.0	10/960	5.0	319/2
MRF860	13.7 (CW)	A	1.1	11/900	1.9	395B/1
MRF892(2)	14	C	2	8.5/900	3.5	319/1
MRF861	27 (CW)	A	8	9.5/900	0.92	375A/1
MRF894(2)	30	C	6	7/900	1.5	319/1
MRF897(3)	30	AB	3	10/900	1.7	395B/1
MRF897R(3)★	30	AB	3	10.5/900	1.7	395B/1
TP3034	35	AB	7	7/960	2.3	319/2
MRF862	36 (CW)	A	4.5	9/900	0.75	375A/1
MRF898(2)	60	C	12	7/900	1	333A/1
V_{CC} = 26 Volts — Si Bipolar						
MRF880(3)	90	AB	12.7	8.5/900	1.3	375A/1
TP3069	100	AB	18	7.5/960	0.7	375A/1
MRF899(3)	150	AB	24	8/900	0.8	375A/1

(2)Internal Impedance Matched

(3)Internal Impedance Matched Push-Pull Transistors

★New Product

1.5 GHz Transistors

Table 10. 1400 – 1640 MHz Band

Device	P_{out} Output Power Watts	Class	P_{in}(Max) Input Power Watts	Gp (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
MRF16006	6	C	1.09	7.4/1600	6.8	395C/2
MRF16030	30	C	5.33	7.5/1600	1.7	395C/2

Microwave Transistors

Table 11. L–Band Pulse Power

These products are designed to operate in short pulse width, 10 μs, low duty cycle, 1%, power amplifiers operating in the 960–1215 MHz band. All devices have internal impedance matching. The prime application is avionics equipment for distance measuring (DME), area navigation (TACAN) and interrogation (IFF).

Device	P_{out} Output Power Watts	P_{in}(Max) Input Power Watts	G_P (Min) Gain @ 1090 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 18 Volts — Class A & AB Common Emitter					
MRF1000MA	0.2	0.02	10	25	332–04/2
MRF1000MB	0.2	0.02	10	25	332A/2
V_{CC} = 35 Volts — Class B & C Common Base					
MRF1004MA	4	0.4	10	25	332–04/1
V_{CC} = 50 Volts — Class C Common Base					
MRF1090MA	90	9	10	0.6	332–04/1
MRF1150MA	150	25	7.8	0.3	332–04/1
MRF1375	375	80	6.7	0.12	355G/1

Table 12. L–Band Long Pulse Power

These products are designed for pulse power amplifier applications in the 960–1215 MHz frequency range. They are capable of handling up to 10 μs pulses in long pulse trains resulting in up to a 50% duty cycle over a 3.5 millisecond interval. Overall duty cycle is limited to 25% maximum. The primary applications for devices of this type are military systems, specifically JTIDS and commercial systems, specifically Mode S. Package types are hermetic.

Device	P_{out} Output Power Watts	P_{in}(Max) Input Power Watts	G_{PB} (Min) Gain @ 1215 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts — Class C Common Base					
MRF10005	5	0.71	8.5	8	336E/1
V_{CC} = 36 Volts — Class C Common Base					
MRF10031	30	3	10	3	376B/1
MRF10120	120	19	8	0.6	355C/1

Table 12. L–Band Long Pulse Power, Class C Common Base (continued)

Device	P_{out} Output Power Watts	P_{in}(Max) Input Power Watts	G_{PB} (Min) Gain @ 1215 MHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 50 Volts					
MRF10070	70	7	10(7)	0.4	376C/1
MRF10150	150	15	10(7)	0.25	376B/1
MRF10350	350	44	9(7)	0.11	355E/1
MRF10500	500	63	9(7)	0.12	355D/1
MRF10501	500	63	9(7)	0.12	355H/1

Table 13. 2 GHz Narrowband CW

The MRW2000 Series of NPN Silicon microwave power transistors are designed for common base service in amplifier or oscillator applications in the 1–2.3 GHz frequency range.

Device	P_{out} Output Power Watts	P_{in}(Max) Input Power Watts	G_{PB} (Min) Gain @ 2 GHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts — Class B & C Common Base					
MRW2001	1	0.13	9	35	328A/1
MRW2005	5	0.8	8	8.5	328A/1

Table 14. 3 GHz Narrowband CW, Class B & C Common Base

The MRW3000 Series are the industry's first 100% VSWR tolerant 3 GHz devices. They are common–base configured in hermetic packages and rated for 28 volt operation.

Device	P_{out} Output Power Watts	P_{in}(Max) Input Power Watts	G_{PB} (Min) Gain @ 3.0 GHz dB	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts					
MRW3001	1	0.2	7	35	328A/1
MRW3003	3	0.75	6	17	328A/1
MRW3005	5	1.6	5	8.5	328A/1

(7)Typical @ 1090 MHz

Linear Transistors

The following sections describe a wide variety of devices specifically characterized for linear amplification. Included are medium power and high power parts covering frequencies from 100 MHz – 4 GHz.

Table 15. To 1 GHz, Class A

These devices offer a selection of performance and price for linear amplification to 1 GHz. The “MRA” prefix parts are input matched and feature high overdrive and extreme ruggedness capability.

Device	P_o @ 1 dB Comp. Point Watts	G_{SS} (Min)/Freq. Small Signal Gain dB/MHz	Bias Point (Vdc/A)	θ_{JC} °C/W	Package/Style
V_{CC} = 19 Volts					
MRA1000–7L	7	9/1000	19/1.2	4	145D–02/1
MRA1000–14L	14	8/1000	19/2.4	2.1	145D–02/1
V_{CC} = 25 Volts					
MRF1029(9)	1.5	8/1000	25/0.2	12	244/1
MRF1032(9)	6	6.5/1000	25/0.85	3.5	244/1

Table 16. To 2 GHz, Class A

These parts offer low cost alternatives to matched devices used primarily as pre–drivers to 2 GHz.

Device	P_o @ 1 dB Comp. Point Watts	G_{SS} (Min)/Freq. Small Signal Gain dB/MHz	Bias Point (Vdc/A)	θ_{JC} °C/W	Package/Style
V_{CC} = 20 Volts					
MRF3094(9)	0.5	10.5/2000	20/0.12	40	328A/2
MRF3104(9)	0.5	10.5/2000	20/0.12	40	305A/1
MRF3095(9)	0.8	9/2000	20/0.12	35	328A/2
MRF3105(9)	0.8	9/2000	20/0.12	35	305A/1
MRF3096(9)	1.6	9/2000	20/0.24	22	328A/2
MRF3106(9)	1.6	9/2000	20/0.24	22	305A/1
MRF2000–5L(10)	5	7/2000	19/0.6	10	360A/2

Table 17. UHF Ultra Linear For TV Applications

The following devices have been characterized for ultra–linear applications such as low–power TV transmitters in Band IV and Band V. Each features diffused ballast resistors and an all–gold metal system to provide enhanced reliability and ruggedness.

Device	P_{ref}(Min) Watts	G_P (Min)/Freq. Small Signal Gain dB/MHz	3 Tone IMD(8) dB	θ_{JC} °C/W	Package/Style
V_{CC} = 20 Volts, Class A					
TPV596A	0.5	11.5/860	–58	20	244/1
TPV597	1	10.5/860	–58	9	244/1
TPV598	4	7/860	–60	5	244/1
V_{CC} = 25 Volts, Class A					
TPV695A	14	9.5/860	–47	2.5	395B/1
TPV7025	25	8.5/860	–45	1.5	398/1
TPV6030	20/35(11)	9.5/860	–51/–	1.1	375A/1
V_{CC} = 26 Volts, Class AB					
MRF6414★	—	8.5/960	—	1.3	333A/2
V_{CC} = 28 Volts, Class AB					
TPV8100B	100(11)	8.5/860	—	0.7	398/1

(8)Vision Carrier: – 8 dB; Sound Carrier: – 7 dB; Sideband Carrier: – 16 dB

(9)Former Prefix was “RF”

(10)Former prefix was “MRA.”

(11)Output power at 1 dB compression in Class AB

★ New Product

Table 18. Microwave Linear For PCN Applications

The following devices have been developed for linear amplifiers in the 1.5–2 GHz region and have characteristics particularly suitable for PCN base station applications.

Device	P_{out} Watts	Class	Bias Point Vdc/mA	Gain (Typ)/Freq dB/MHz	θ_{JC} °C/W	Package/Style
MRF6401(12)	0.5	A	20/80	10/1880	30	305C/1
MRF6402(13)	4.5	AB	26/40	10/1880	5	319/2
MRF6404(16)	30	AB	26/150	8.5/1880	1.4	395C/1
MRF6408★	12	AB	26/100	8.8/1880	2.8	395C/1
MRF15030	30	A, AB	26/125	9/1490	1.4	395C/1
MRF15060(46)	60	A, AB	26/200	10/1490	0.7	451/451A/1
MRF15090	90	A, AB	26/250	7.5/1490	0.7	375A/1
MRF20060(46)	60	A, AB	26/200	9/2000	0.7	451/1

Table 19. Microwave Linear Power

Common emitter microwave devices are offered for a wide variety of uses in small and medium signal, Class A, AB and C applications up to 4 GHz. The use of all–gold metal systems, diffused ballast resistors and hermetic packaging results in devices that display excellent reliability even in a military environment.

Device	G_{SS} (Min) @ Freq. Small Signal Gain dB/GHz	1 dB Comp. Watts	P_{sat} Watts	–30 dB IMD Watts	Emitter Current mA	Package/Style
V_{DD} = 20 Volts						
MRW53502	5/3	1.6	2	1.5	230	401/1
MRW53601	6/3	0.8	1	0.8	120	328A/1
MRW54001	5/4	0.5	0.8	0.5	120	400/1
MRW54601	6/4	0.5	0.8	0.5	120	328A/1

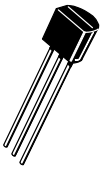
(12)Formerly known as “TP4001S”

(13)Formerly known as “TP4004”

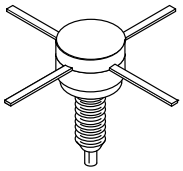
(16)Formerly known as “TP4035”

(46)To be introduced 2nd half of 1996.

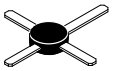
★New Product



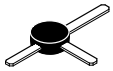
CASE 29–04
STYLE 2
(TO–226AA)



CASE 244A
STYLE 1

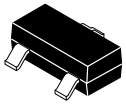


CASE 317
STYLE 2
(MACRO–X)

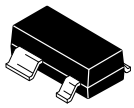


CASE 317A
STYLE 2
(MACRO–T)

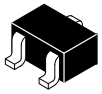
CASE 317D
STYLE 2
(POWER MACRO)



CASE 318–08
STYLE 6
(SOT–23)



CASE 318A
STYLE 1
LOW PROFILE
(SOT–143)



CASE 419
STYLE 3, 6
(SC–70/SOT–323)

CASE 751
STYLE 1
(SO–8)

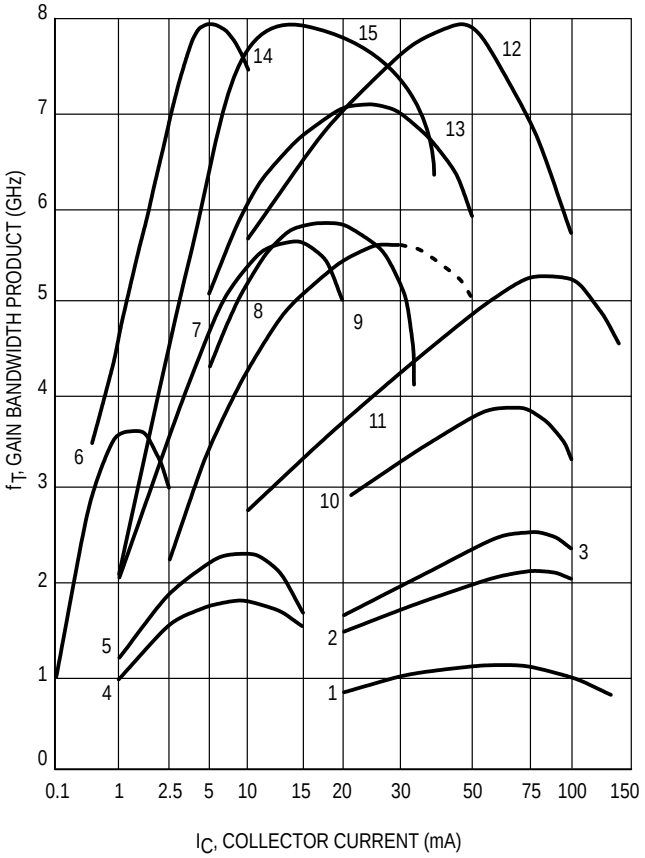
RF Small Signal Transistors

Motorola's broad line of RF Small Signal Transistors includes NPN and PNP Silicon Bipolar Transistors characterized for low noise amplifiers, mixers, oscillators, multipliers, non–saturated switches and low–power drivers.

These devices are available in a wide variety of package types: plastic Macro–X and Macro–T, ceramic and surface mounted. Most of these transistors are fully characterized with s–parameters.

RF Small Signal Transistors

RF Small Signal Transistor Gain Characteristics



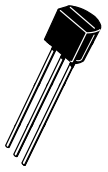
Curve numbers apply to transistors listed in the subsequent tables.

Selection by Package

In small–signal RF applications, the package style is often determined by the end application or circuit construction technique. To aid the circuit designer in device selection, the Motorola broad range of RF small–signal amplifier transistors is organized by package. Devices for other applications such as oscillators or switches are shown in the appropriate preceding tables. **These devices are NPN polarity unless otherwise designated.**

Plastic SOE Case

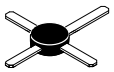
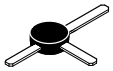
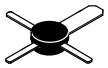
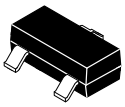
Table 1. Plastic SOE Case

Device	Gain–Bandwidth @		Curve No. Page 5.10–15	NF_{min} @ f		Gain @ f		Maximum Ratings		Package
	f_T Typ GHz	I_C mA		Typ dB	MHz	Typ dB	MHz	$V_{(BR)CEO}$ Volts	I_C mA	
Case 29–04/1,2, TO–226AA										
LP1001	5	10	—	2.7	500	12.5	1000	15	—	
LP1001A	5	10	—	3.2	1000	12.5	1000	15	—	
MPS901(29)	4.5	15	7	2.4	900	12	900	15	30	
MPS911(29)	7	30	8	1.7	500	16.5	500	12	40	
MPS571	8	50	12	2	500	14	500	10	80	
MPS3866	0.8	50	1	—	—	10	400	30	400	

(29)Packaging Options Available in Tape and Reel and Fan Fold Box

Selection by Package (continued)

Table 1. Plastic SOE Case (continued)

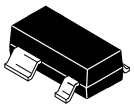
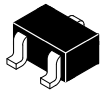
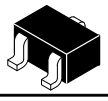
Device	Gain–Bandwidth @ f_T Typ GHz	Gain–Bandwidth @ I_C mA	Curve No. Page 5.10–15	NF_{min} @ f Typ dB	NF_{min} @ f MHz	Gain @ f Typ dB	Gain @ f MHz	Maximum Ratings $V_{(BR)CEO}$ Volts	Maximum Ratings I_C mA	Package
Case 317/2 — MACRO–X										
MRF901	4.5	15	7	2	1000	12	1000	15	30	
MRF941	8	15	15	2.1	2000	12.5	2000	10	50	
MRF571	8	50	12	1.5	1000	12	1000	10	70	
MRF951	8	30	—	2.1	2000	12.5	2000	10	100	
MRF559	3	100	10	—	—	13	512	18	150	
MRF581	5	75	11	2	500	15.5	500	18	200	
MRF581A	5	75	11	1.8	500	15.5	500	15	200	
MRF837	5	75	11	—	—	10	870	16	200	
Case 317A/2 — MACRO–T										
BFR90	5	14	7	2.4	500	18	500	15	30	
BFR96	4.5	50	9	2	500	14.5	500	15	100	
Case 317D/2										
MRF553	—	—	—	—	—	13	175	16	500	
MRF555	—	—	—	—	—	12.5	470	16	400	
MRF557	—	—	—	—	—	9	870	16	400	
Case 318–08/6 — SOT–23										
MMBR521LT1[17][18c]	3.4	–35	—	1.5	500	15	500	–10	–70	
MMBR931LT1[18c]	3	1	6	4.3	1000	10	1000	5	5	
MMBR5031LT1[18c]	1	5	—	2.5	450	17	450	10	20	
BFS17LT1[18c]	1.3	25	—	—	—	—	—	15	—	
BFR92ALT1[18c]	4.5	14	—	—	—	15	—	15	25	
MMBR901LT1[18c]	4	15	7	1.9	1000	12	1000	15	30	
BFR93ALT1[18c]	3.4	30	—	2.5	30	—	—	12	35	
MMBR920LT1[18c]	4.5	14	—	2.4	500	15	500	15	35	
MMBR5179LT1[18c]	1.4	5	4	—	—	15	200	12	50	
MMBR941LT1[18c,d]	8	15	15	2.1	2000	8.5	2000	10	50	
MMBR941BLT1[18c,d]	8	15	15	2.1	2000	8.5	2000	10	50	
MMBR911LT1[18c]	6	30	8	2	500	17	500	12	60	
MMBR571LT1[18c]	8	50	12	2	500	16.5	500	10	80	
MMBR951LT1[18c]	8	30	—	2.1	2000	7.5	2000	10	100	
MMBR951ALT1[18c]	8	30	—	2.1	2000	7.5	2000	10	100	

[17] PNP

[18] Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.

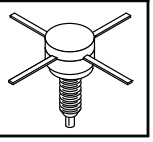
Selection by Package (continued)

Table 1. Plastic SOE Case (continued)

Device	Gain–Bandwidth @ f_T Typ GHz	Gain–Bandwidth @ I_C mA	Curve No. Page 5.10–15	NF_{min} @ f Typ dB	NF_{min} @ f MHz	Gain @ f Typ dB	Gain @ f MHz	Maximum Ratings $V_{(BR)CEO}$ Volts	Maximum Ratings I_C mA	Package
Case 318A/1 — SOT–143										
MRF5711LT1(18c)	8	50	12	1.6	1000	13.5	1000	10	70	
MRF5211LT1(17)(18c)	4.2	–50	—	2.8	1000	11	1000	–10	–70	
MRF9331LT1(18c)	5	1	—	2.5	1000	12.5	1000	8	2	
MRF9011LT1(18c)	3.8	15	7	2.3	1000	10.2	1000	15	30	
MRF9411LT1(18c)	8	15	15	2.1	2000	9.5	2000	10	50	
MRF9411BLT1(18c)	8	15	15	2.1	2000	9.5	2000	10	50	
MRF0211LT1(18c)	5.5	40	12	1.8	1000	9.5	1000	15	70	
MRF5811LT1(18c)★	5	75	11	2.0	500	18.4	500	18	200	
MRF9511LT1(18c)	8	30	—	2.1	2000	9	2000	10	100	
MRF9511ALT1(18c)	8	30	—	2.1	2000	9	2000	10	100	
Case 419/3 — SC–70/SOT–323										
MRF917T1★	6	20	8	2.3	1000	10	1000	12	60	
MRF927T1(18c)★	8	5	14	1.7	1000	9.8	1000	10	10	
MRF947T1(18c,d)	8	15	15	2.1	2000	10.5	1500	10	50	
MRF947AT1(18c)	8	15	15	2.1	2000	10.5	1500	10	50	
MRF947BT1(18c,d)	8	15	15	2.1	2000	10.5	1500	10	50	
MRF957T1(18c)	8	30	—	2.0	2000	9	1500	10	100	
Case 419/6 — SC–70/SOT–323										
MRF947RT3(18d)	8	15	—	2.1	2000	10.5	1500	10	50	
Case 751/1 — SO–8										
MRF5943(18a,b)	1.5	35	2	3.4	200	12	250	30	400	
MRF3866R2(18b)	0.8	50	1	—	—	10.5	400	30	400	
MRF4427(18b)	1.6	50	1	—	—	18	175	20	400	
MRF5812(18a,b)	5.5	75	11	2	500	15.5	500	15	200	
MRF8372(18a,b)	5	75	11	—	—	10	870	16	200	

Ceramic SOE Case

Table 2. Ceramic SOE Case

Device	Gain–Bandwidth @ f_T Typ GHz	Gain–Bandwidth @ I_C mA	Curve No. Page 5.10–15	N @ f Typ dB	N @ f MHz	Gain @ f Typ dB	Gain @ f MHz	Maximum Ratings $V_{(BR)CEO}$ Volts	Maximum Ratings I_C mA	Package
Case 244A/1										
MRF587	5.5	90	11	3	500	13	500	15	200	

(17)PNP

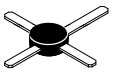
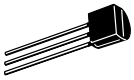
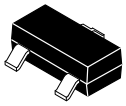
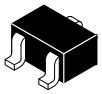
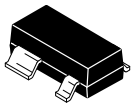
(18)Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.

★ New Product

Selection by Application

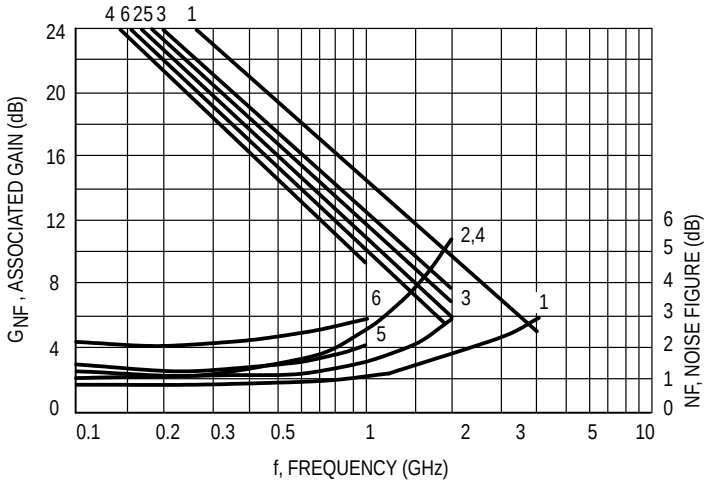
Table 3. Low Noise

The Small–Signal devices listed are designed for low noise and high gain amplifier mixer, and multiplier applications. Each transistor type is available in various packages. **Polarity is NPN unless otherwise noted.**

Package	Name	Case Number	Curve Number (See figure below)					
			1	2[17]	3	4	5	6
	MACRO–X	317/2	MRF941 MRF951[20]	—	MRF571	MRF581	MRF901	—
	TO–226AA	29–04/2	—	—	MPS571	—	MPS901	MPS911
	SOT–23	318–08/6	MMBR941LT1 MMBR941BLT1 MMBR951LT1[20]	MMBR521LT1	MMBR571LT1	—	MMBR901LT1	MMBR911LT1
	SC–70/ SOT–323	419/3, 6	MRF917T1 MRF927T1 MRF947AT1 MRF947T1 MRF947BT1 MRF947RT3 MRF957T1[20]	—	—	—	—	—
	SOT–143	318A/1	MRF9411BLT1 MRF9411LT1 MRF9511LT1[20] MRF9511ALT1	MRF5211LT1	MRF5711LT1 MRF0211LT1	MRF5811LT1	MRF9011LT1	—
	SO–8	751/1	—	—	—	MRF5812	—	—

[17]PNP

[20]Higher Current Version



Gain and Noise Figure versus Frequency

Selection by Application (continued)

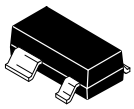
Table 4. CATV, MATV and Class A Linear

For Class A linear CATV/MATV applications. Listed according to increasing gain bandwidth (f_T).

Device	Nominal Test Conditions V_{CE}/I_C Volts/mA	f_T Typ MHz	Noise Figure	Distortion Specifications				$V_{(BR)CEO}$ V	Package/ Style
			Typ/Freq. dB/MHz	2nd Order IMD dBc	3rd Order IMD dBc	12 Ch. Cross–Mod. dBc	Output Level dBmV		
MMBR5179LT1(18c)	6/5	1500	4/450					12	318–08/6
MRF5943(18a,b)	15/50	1500	3.4/200					30	751/1
MMBR5031LT1(18c,d)	6/5	2000	1.9/450					10	318–08/6
MMBR920LT1(18c,d)	10/14	4500	2.4/500					15	318–08/6
BFR96	10/50	4500	2/500					15	317A/2
BFR90	10/14	5000	2.4/500					15	317A/2
MRF581	10/75	5000	2.7/300		–65		+50	18	317/2
MRF581A	10/75	5000	1.8/500		–65		+50	15	317/2
MRF5812(18a,b)	10/75	5000	1.8/500		–65		+50	15	751/1
LP1001		5000	2.7/500					15	29–04/2
LP1001A		5000	3.2/1000					15	29–04/2
MRF587	15/90	5500	3/500	–52	–72		+50	17	244A/1

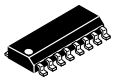
(17)PNP

(18)Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.

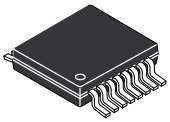


CASE 318A–05
(SOT–143)

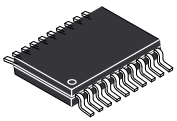
CASE 751
(SO–8)



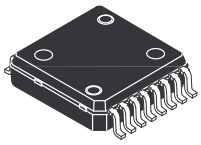
CASE 751B
(SO–16)



CASE 948C
(TSSOP–16)



CASE 948D
(TSSOP–20)



CASE 978
(PFP–16)

Monolithic Integrated Circuits

Motorola's RF monolithic integrated circuit devices provide an integrated solution for the personal communications market. These devices are available in plastic SOIC–8, SOIC–16, SOT–143, TSSOP–16, TSSOP–20 or PFP–16 packages.

Evaluation Boards

Evaluation boards are available for RF Monolithic Integrated Circuits by adding a "TF" suffix to the device type. For a complete list of currently available boards and ones in development for newly introduced product, please contact your local Motorola Distributor or Sales Office.

RF Monolithic Integrated Circuits

Switching

Antenna Switches

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current μA (Typ)	P_{in}, 1 dB Compression dBm (Typ)	TX Insertion Loss dB (Typ)	Isolation dB (Typ)	Package	System Applicability
MRFIC2003[18b]	100–1000	2.8–6.0	<10	21	0.5	20	SO–8	CT2, ISM
MRFIC1801[18b]	1500–2500	2.7–5.5	300	29	0.6	20	SO–8	DECT, PHS, PCS, ISM
MRFIC0903[18b] ★	100–2000	2.7–5.0	60	35.5	0.65	21	SO–8	AMPS, Class 4 & 5 GSM, DCS1800, PHS, PCS

Receiver Functions

General Purpose Integrated Circuits

General Purpose Cascode Amplifier

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain @ 900 MHz dB (Typ)	Noise Figure dB (Typ)	Reverse Isolation dB (Typ)	Package	System Applicability
MRFIC0915[18c,46]	100–2000	2.7–5.0	2.2	16.5	1.9	38	SOT–143	AMPS, CT1, CT2, GSM, IS–54, ISM, DECT, PHS, PCS
MRFIC0916[18c] ★	100–2000	2.7–5.0	4.7	18.5	1.9	44	SOT–143	AMPS, CT1, CT2, GSM, IS–54, ISM, DECT, PHS, PCS

900 MHz Front End

LNA + Mixer

Device	RF Freq. Range MHz	IF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Conv. Gain dB (Typ)	Output Level, 1 dB Comp. dBm (Typ)	Package	System Applicability
MRFIC2001[18b]	500–1000	0–250	2.7–5.0	4.7	23	–10	SO–8	CT2, ISM

1.5 – 2.2 GHz Front End

Integrated LNA

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain dB (Typ)	Noise Figure dB (Typ)	Reverse Isolation dB (Typ)	Package	System Applicability
MRFIC1501[18b] ★	1000–2000	3–5	5.7	18	1.1	26	SO–8	DECT, PHS, PCS
MRFIC1808[18b] ★	1700–2100	2.7–4.5	4.2	17	1.6	37	SO–8	DECT, PHS, PCS

[18]Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
[46]To be introduced 2nd half of 1996.
★ New Product

Receiver Functions: 1.5 – 2.2 GHz Front End (continued)

Integrated LNA/Downconverter

Device	RF Freq. Range GHz	IF Freq. Range GHz	Supply Volt. Range Vdc	Supply Current RX Mode mA (Typ)	Mixer Conv. Gain dB (Typ)	LNA Gain dB (Typ)	LNA Noise Figure dB (Typ)	Package	System Applicability
MRFIC1804[18b]	1.8–2.0	70–325	2.7–3.3	10	4	14	2.3	SO–16	DECT,PHS,PCS
MRFIC1814[18b,46]	1.8–2.0	70–300	2.7–4.5	10	9	17	2.5	TSSOP–16	DECT,PHS,PCS

2.4 GHz Front End

Integrated LNA/Downconverter

Device	RF Freq. Range MHz	IF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Conv. Gain dB (Typ)	LNA Noise Figure dB (Typ)	Isolation Lo to RF, Lo to IF dB (Typ)	Package	System Applicability
MRFIC2401[18b]	2400–2500	100–350	4.75–5.25	9.5	21	1.9	20	SO–16	WLAN, MMDS, ISM

Transmitter Functions

General Purpose Integrated Circuits

Quadrature Modulator

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Gain Control dB (Typ)	Lo Leakage dBm (Typ)	SSB P_{out}, 1 dB Compression dBm (Typ)	Package	System Applicability
MRFIC0001[18b]	50–260	2.7–5.5	10	30	–55	–10	TSSOP–20	DCS1800, GSM, NADC PDC, PHS

General Purpose Cascode Amplifier

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain @ 900 MHz dB (Typ)	Noise Figure dB (Typ)	Reverse Isolation dB (Typ)	Package	System Applicability
MRFIC0915[18c,46]	100–2000	2.7–5.0	2.2	16.5	1.9	38	SOT–143	AMPS,CT1,CT2,GSM,IS–54, ISM,DECT,PHS,PCS
MRFIC0916[18c]★	100–2000	2.7–5.0	4.7	18.5	1.9	44	SOT–143	AMPS,CT1,CT2,GSM,IS–54, ISM,DECT,PHS,PCS

[18]Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
[46]To be introduced 2nd half of 1996.
★ New Product

900 MHz Transmit Chain

Transmit Mixer

Device	RF Freq. Range MHz	IF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current μA (Typ)	Conv. Gain dB (Typ)	Output Level, 1 dB Comp. dBm (Typ)	Package	System Applicability
MRFIC2002(18b)	500–1000	0–250	2.7–5.0	5.5	0.1	10	–18	SO–8	AMPS,CT1,CT2, GSM, IS–54, ISM
MRFIC2101(18b)	800–1000	0–250	3–4.75	45	2	26.5	4.5	SO–16	AMPS,CT1,CT2, GSM, IS–54, ISM

Driver Amplifier

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current mA (Typ)	Small Signal Gain dB (Typ)	Gain Control dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	System Applicability
MRFIC2004(18b)	800–1000	2.7–4.0	11	0.7	21.5	34	–1	SO–16	AMPS,CT1,CT2, GSM,ISM
MRFIC2006(18b)	500–1000	1.8–4.0	46	—	23	—	15.5	SO–8	AMPS,CT1,CT2, GSM,ISM
MRFIC0904(18b) ★	800–1000	2.7–5.0(47)	280	0.05	27	24.5	25.5	SO–16	AMPS,GSM,ISM

Integrated Power Amplifiers

Low Power 900 MHz Power Amplifiers

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain dB (Typ)	Return Loss Input/Output dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	Semiconductor Technology
MRFIC2006(18b)	500–1000	1.8–4.0	46	23	15	15.5	SO–8	Silicon

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current mA (Typ)	Small Signal Gain dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	Semiconductor Technology
MRFIC2101(18b)	800–1000	3 – 4.75	38	2	16	18	SO–16	Silicon

Analog Cellular

Device	Freq. Range MHz	Supply Volt. Vdc	Power Added Efficiency % (Min)	Power Gain dB (Min)	Harmonic Output 2fo dBc	P_{out}/P_{in} dBm (Min)	Package	Semiconductor Technology
MRFIC0910(18e,46)	824–905	4.8	50	17.8	–40	30.8/13	PFP–16	LDMOS
MRFIC0911(18e,46)	824–905	6.0	50	18.5	–35	31.5/13	PFP–16	LDMOS
MRFIC0912(18e,46)	824–905	4.6(47)	55	21.8	–20	30.8/9	PFP–16	GaAs

(18) Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
(46) To be introduced 2nd half of 1996.
(47) Negative supply required
★ New Product

Transmitter Functions: 900 MHz Transmit Chain: Integrated Power Amplifiers (continued)

GSM Cellular

Device	Freq. Range MHz	Supply Volt. Vdc	Power Added Efficiency % (Min)	Power Gain dB (Min)	Harmonic Output 2fo dBc	P_{out}/P_{in} dBm (Min)	Package	Semiconductor Technology
MRFIC0913(18e)★	880–915	4.8(47)	48	24.5	–30	34.5/10	PFP–16	GaAs
MRFIC0917(18e,46)	880–915	3.6(47)	45	24.5	–30	34.5/10	PFP–16	GaAs

DCS1800, PCS1900

Device	Freq. Range MHz	Supply Volt. Vdc	Power Added Efficiency % (Min)	Power Gain dB (Min)	Harmonic Output 2fo dBc	P_{out}/P_{in} dBm (Min)	Package	Semiconductor Technology
MRFIC1818(18e,46)	1.7–1.9	4.8(47)	35	30	–30	33/3	PFP–16	GaAs

Two–way Paging, ISM

Device	Freq. Range MHz	Supply Volt. Vdc	Power Added Efficiency % (Min)	Power Gain dB (Min)	Harmonic Output 2fo dBc	P_{out}/P_{in} dBm (Typ)	Package	Semiconductor Technology
MRFIC0914(18b)★	890–950	4.8	40	28	–45	30.5/2.5	SO–16	LDMOS

1.5 – 2.2 GHz Transmit Chain

Upconverter

Device	RF Output Freq. Range GHz	Supply Volt. Range Vdc	Supply Current TX Mode mA (Typ)	Standby Current μA (Typ)	Conv. Gain dB (Typ)	Recommended IF Input MHz (Typ)	P_{out}, 1 dB Comp. dBm (Typ)	Package	System Applicability
MRFIC1803(18b)	1.7–2.5	2.7–3.3	28	100	10	70–350	–2	SO–16	DECT,PHS, PCS
MRFIC1813(18b)★	1.7–2.5	2.7–4.5	24	25	15	70–350	2	TSSOP–16	DECT,PHS, PCS

Power Amplifier

Device	RF Output Freq. Range GHz	Supply Volt. Range Vdc(47)	Supply Current mA (Typ)	Standby Current mA (Typ)	Small Signal Gain dB (Typ)	P_{out}/P_{in} dBm (Typ)	1 dB Comp. dBm (Typ)	Pkg	System Applicability
MRFIC1805(18b,46)	1.7–2.5	2.7–5.0	190	0.25	21	22/0	23	TSSOP–16	DECT,PHS, PCS
MRFIC1806(18b)	1.5–2.5	3.0–5.0	115	0.25	23	19.5/–3	21	SO–16	DECT,PHS, PCS
MRFIC1807(18b)	1.5–2.2	3.0–5.0	325	0.06	8	26.8/20	25	SO–16	DECT,PHS, PCS

(18)Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
(46)To be introduced 2nd half of 1996.
(47) Negative supply required
★ New Product

Transmitter Functions: 1.5 – 2.2 GHz Transmit Chain (continued)

Power Amplifier

Device	RF Output Freq. Range GHz	Supply Volt. Range Vdc	PA Supply Current TX Mode mA (Typ)	Standby Current mA (Typ)	Small Signal Gain dB (Typ)	Insertion Loss Rx Mode dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	System Applicability
MRFIC1807[18b] (TX/RX Switch)	1.5–2.2	3.0–5.0	325	0.06	8	1	25	SO–16	DECT, PHS, PCS

2.4 GHz Transmit Chain

Exciter Amplifier

Device	Freq. Range GHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain dB (Typ)	Noise Figure dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	System Applicability
MRFIC2404[18b]	2.0–3.0	4.75–5.25	9	17	4.3	5	SO–8	WLAN, MMDS, ISM

Power Amplifier

Device	Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Small Signal Gain dB (Typ)	Power Control Range dB (Typ)	P_{out}, 1 dB Compression dBm (Typ)	Package	System Applicability
MRFIC2403[18b]	2200–2700	4.75–5.25	95	23	20	19	SO–16	WLAN, MMDS, ISM

Upconverter

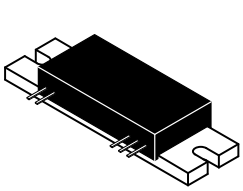
Device	RF Output Freq. Range GHz	Supply Volt. Range Vdc	Supply Current TX Mode mA (Typ)	Standby Current μA (Typ)	Conv. Gain dB (Typ)	Recommended IF Input MHz (Typ)	P_{out}, 1 dB Comp. dBm (Typ)	Package	System Applicability
MRFIC1803[18b]	1.7–2.5	2.7–3.3	28	100	10	70–350	–2	SO–16	WLAN, ISM
MRFIC1813[18b]★	1.7–2.5	2.7–4.5	24	25	15	70–350	2	TSSOP–16	WLAN, ISM
MRFIC2406[18b,46]	2.4–2.5	3–5	15	.6	6	100–370	–10	SO–16	WLAN, MMDS, ISM

[18]Tape and Reel Packaging Available by adding suffix: a) R1 = 500 units; b) R2 = 2,500 units; c) T1 = 3,000 units; d) T3 = 10,000 units; e) R2 = 1,500 units.
[46]To be introduced 2nd half of 1996.

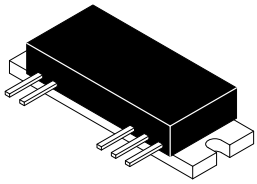
RF Amplifiers

Motorola's line of RF amplifiers designed and specified for use in land mobile radios, CATV distribution systems and general purpose wideband amplification applications. They feature small size, matched inputs and outputs, high stability and guaranteed performance specifications. For the user, they offer the benefits of smaller and less complex system designs in less time and at lower overall cost.

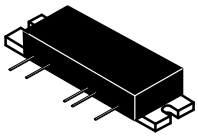
Each amplifier uses modern transistor chips which are gold metallized and have silicon nitride passivation for increased reliability and long life. Chip and wire construction features MOS capacitors and laser trimmed nichrome resistors. Circuit substrates and metallization have been selected for optimum performance cost and reliablity.



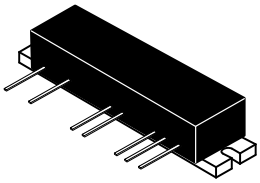
CASE 301AA
STYLE 1



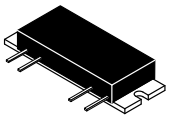
CASE 301AB
STYLE 1



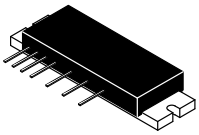
CASE 301E
STYLE 1



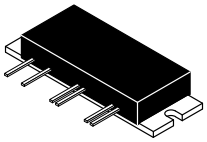
CASE 301F
STYLE 1



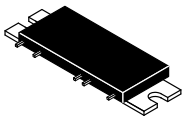
CASE 301H
STYLE 2



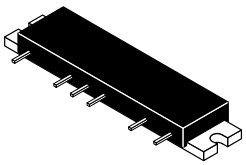
CASE 301J
STYLE 1



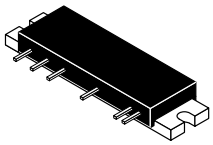
CASE 301K
STYLE 3



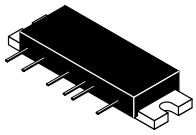
CASE 301N
STYLE 1



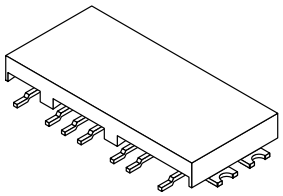
CASE 301R
STYLE 1



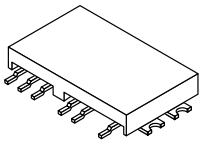
CASE 301T
STYLE 1



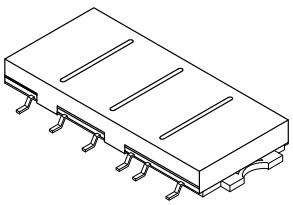
CASE 301V
STYLE 1



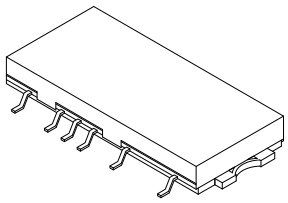
CASE 420
STYLE 1



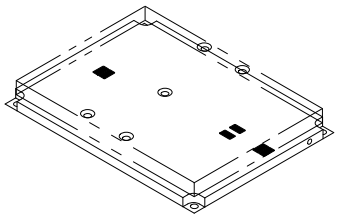
CASE 420A
STYLE 1



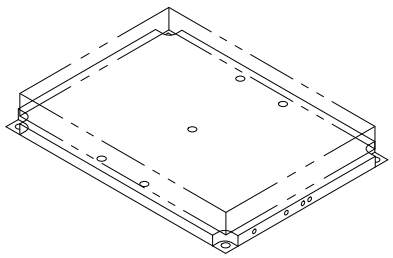
CASE 420L
STYLE 1



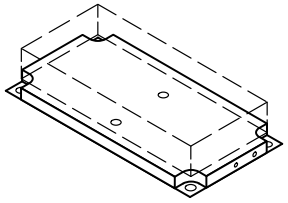
CASE 420U
STYLE 1



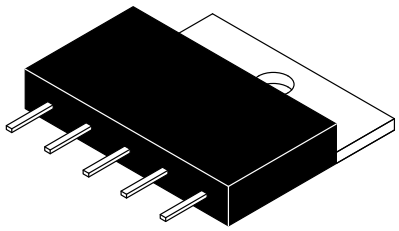
CASE 429A
STYLE 1



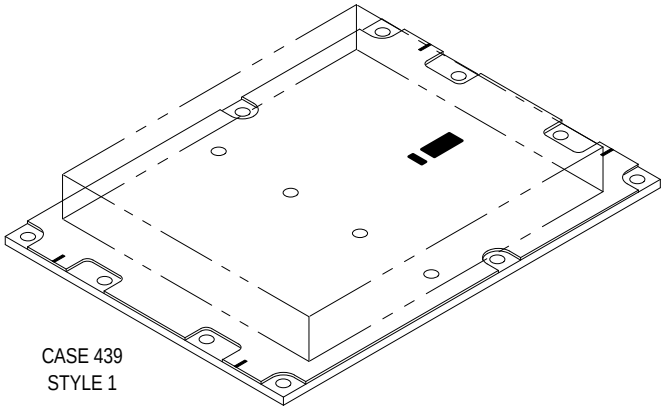
CASE 429C
STYLE 1



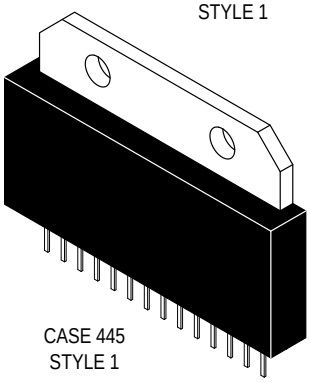
CASE 429E
STYLE 1



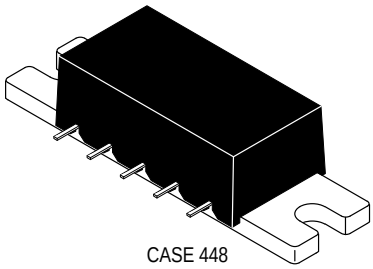
CASE 431A
STYLE 1



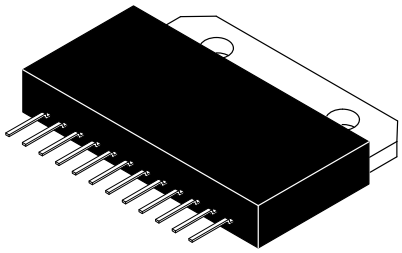
CASE 439
STYLE 1



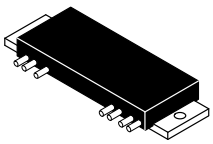
CASE 445
STYLE 1



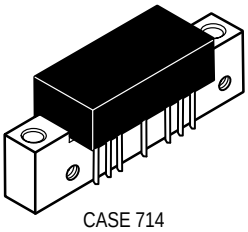
CASE 448
STYLE 1, 2



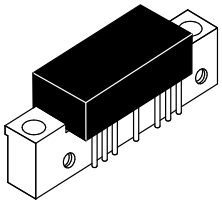
CASE 455
STYLE 1



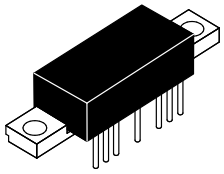
CASE 700
STYLE 2



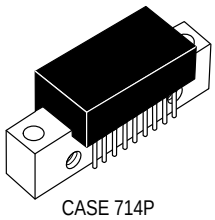
CASE 714
STYLE 1



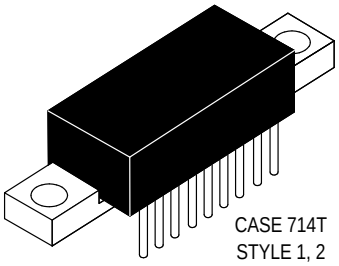
CASE 714F
STYLE 1



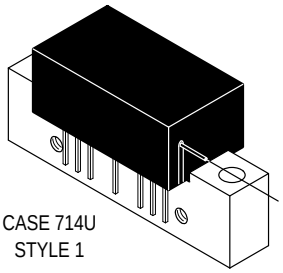
CASE 714G
STYLE 1



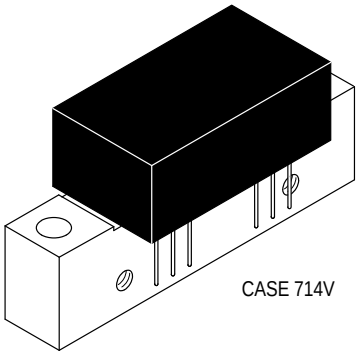
CASE 714P
STYLE 2, 3



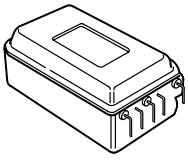
CASE 714T
STYLE 1, 2



CASE 714U
STYLE 1



CASE 714V



CASE 825A
STYLE 2

RF Amplifiers

High Power

Complete amplifiers with 50 ohm in/out impedances are available for a variety of applications including land mobile radios, base stations, TV transmitters and other uses requiring large–signal amplification, both linear and Class C. Frequencies covered range from 68–1785 MHz with power levels extending to 180 watts.

Land Mobile/Portable

The advantages of small size, reproducibility and overall lower cost become more pronounced with increasing frequency of operation. These amplifiers offer a wide range in power levels and gain, with guaranteed performance specifications for bandwidth, stability and ruggedness.

Table 1. VHF/UHF, Class C

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	f Frequency MHz	G_P Power Gain, Min dB	V_{CC} Supply Voltage Volts	Package/Style
68–210 MHz, VHF Band — Class C (Silicon Bipolar Die)						
MHW105	5	0.001	68–88	37	7.5	301K/3
MHW607–1	7	0.001	136–150	38.4	7.5	301K/3
MHW607–2	7	0.001	146–174	38.4	7.5	301K/3
MHW607–3	7	0.001	174–195	38.4	7.5	301K/3
MHW607–4	7	0.001	184–210	38.4	7.5	301K/3
400–512 MHz, UHF Band — Class C (Silicon Bipolar Die)						
MHW704–1	3	0.001	400 – 440	34.8	6.0	301J/1
MHW704–2	3	0.001	440 – 470	34.8	6.0	301J/1
MHW707–1	7	0.001	403 – 440	38.4	7.5	301J/1
MHW707–2	7	0.001	440 – 470	38.4	7.5	301J/1
MHW707–3	7	0.001	470 – 500	38.4	7.5	301J/1
MHW707–4	7(23)	0.001	490 – 512	38.4(23)	7.5	301J/1
MHW720A1(22)	20	0.15	400 – 440	21	12.5	700/2
MHW720A2(22)	20	0.15	440 – 470	21	12.5	700/2
806–960 MHz, UHF Band — Class C (Silicon Bipolar Die)						
MHW851–1	1.6	0.001	820–850	32	6	301N/1
MHW851–2	1.6	0.001	870–905	32	6	301N/1
MHW851–3	2	0.001	890–915	33	6	301N/1
MHW851–4	1.6	0.001	915–925	32	6	301N/1
MHW803–1	2	0.001	820–850	33	7.5	301E/1
MHW803–2	2	0.001	806–870	33	7.5	301E/1
MHW803–3	2	0.001	870–905	33	7.5	301E/1
MHW804–1	4	0.001	800–870	36	7.5	301F/1
MHW806A4(22)	6	0.04	870–950	21.7	12.5	301H/2
806 – 960 MHz, UHF Band — (LDMOS Die)						
MHW2821–1★	20	<0.250	806–870	19	12.5	301AB/1
MHW2821–2★	18	<0.300	890–950	17.9	12.5	301AB/1
1710 – 1785 MHz, UHF Band — (GaAs FET Die)						
MHW9014★	2.1	0.001	1710–1785	33.2	6.0	420/1

(22)Designed for Wide Range P_{out} Level Control

(23)P_O @ f = 490 MHz. P_O = 6.5 W @ f = 512 MHz

★ New Product

Table 2. UHF, Linear

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	f Frequency MHz	G_P Power Gain, Min dB	V_{CC} Supply Voltage Volts	Package/Style
824–849 MHz, UHF Band — Class AB (Silicon Bipolar Die)						
MHW920★	0.8(24)	0.001	824–849	29	6	420U/1
MHW927B(22)	6(24)	0.001	824–849	37.8	12.5	301AA/1
880–960 MHz (for GSM) — Class AB (Silicon Bipolar Die)						
MHW953(22)	3.5	0.001	890–915	35.4	7.2	301V/1
880–960 MHz (for GSM) — Class AB (LDMOS Silicon FET)						
MHW913	14	0.1	880–915	21.5	12.5	301AB/1
MHW914(22)	14	0.001	890–915	41.4	12.5	301R/1
MHW916	16	0.036	925–960	26.5	26	301AB/1

TV Transmitters

Table 3. UHF Ultra Linear for TV Applications

These amplifiers are characterized for ultra–linear applications in Band IV and Band V TV transmitters.

Device	Frequency MHz	P_{ref} Watts	G_P (Min)/Freq. Power Gain dB/MHz	3 Tone(8) IMD 1 dB	3 Tone(25) IMD 2 dB	V_{CC} Volts	Class	Package/Style
MRFA2600(26)	470–860	20	10.5/860	–50	–53	26.5	A	429A/1
MRFA2602(28)	470–860	40	9/860	–50	–53	25.5	A	429C/1
RFA8090B	470–860	95(11)	8/860	—	—	28	AB	429E/1
MRFA2604★	470–860	180(11)	8/860	—	—	28	AB	439/1

(8)Vision Carrier: – 8 dB; Sound Carrier: – 7 dB; Sideband Carrier: – 16 dB

(11)Output power at 1 dB compression in Class AB

(22)Designed for Wide Range P_{out} Level Control

(24)Average Power; Peak Power is twice average power

(25)Vision Carrier: – 8 dB; Sound Carrier: – 10 dB; Sideband Carrier: – 16 dB

(26)Formerly known as “RFA6031”

(28)Formerly known as “RFA6060”

★New Product

CATV Distribution

Motorola Hybrids are manufactured using the latest generation technology which has set new standards for CATV system performance and reliability. These hybrids have been optimized to provide premium performance in all CATV systems up to 152 channels.

Table 1. 5–50 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nominal) dB	Channel Loading Capacity	I_{DC} mA Max	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test(30) dB	Composite Triple Beat dB 4 CH	Cross Modulation dB 4 CH	Noise Figure @ 50 MHz dB Max	Package/ Style
Low Current Amplifiers									
MHW1184L	18	4	135	+50	–70	–73	–64	5	714/1
MHW1224L	22	4	135	+50	–70	–72	–63	5	714/1
MHW1254L	25	4	135	+50	–70	–70	–62	4.5	714/1
MHW1304L	30	4	135	+50	–70	–66	–57	4.5	714/1

Table 2. 5–200 MHz Hybrids, V_{CC} = 12 Vdc, Class A

Device	Hybrid Gain (Nominal) dB	Channel Loading Capacity	Maximum Distortion Specifications: 2nd Order Test(48) dB	2nd Order Test(49) dB	2nd Order Test(50) dB	Composite Triple Beat(51) dB (Typ) 22 CH	Composite Triple Beat(51) dB (Typ) 26 CH	Triple Beat dB Typ	Noise Figure @ 200 MHz dB Max	Package/ Style
MHW1254LC(46a)	24.8	22	–68(19)	–59(19)	–57(19)	–69	–66	–71	5.0	431A/1
MHW1304LC(46a)	29.8	22	–68(19)	–59(19)	–57(19)	–71	–67	–71	5.0	431A/1

Table 3. 5–200 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nominal) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test(30) dB	Composite Triple Beat dB 22 CH	Composite Triple Beat dB 26 CH	Cross Modulation dB 22 CH	Cross Modulation dB 26 CH	Noise Figure @ 175 MHz dB Max	Package/ Style
High–Split Reverse Amplifiers										
MHW1134	13	22	+50	–72	–73	–71(19)	–65	–65(19)	7	714/1
MHW1184	18	22	+50	–72	–70	–70(19)	–64	–64(19)	5.5	714/1
MHW1224	22	22	+50	–72	–69	–68.5(19)	–62	–62(19)	5.5	714/1
MHW1244	24	22	+50	–72	–68	–67.5(19)	–61	–61(19)	5	714/1

(19)Typical
(30)Channels 2 and A @ 7
(46)To be introduced: a)1st half of 1996; b) 2nd half of 1996.
(48)12 MHz and 43.25 MHz @ 55.25 MHz, V_{out} = 50 dBmV/ch
(49)54 MHz and 121.25 MHz @ 175.25 MHz, V_{out} = 50 dBmV/ch
(50)54 MHz and 145.25 MHz @ 199.25 MHz, V_{out} = 50 dBmV/ch
(51)44 dBmV/ch

CATV Distribution (continued)

Table 4. 40–450 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nominal) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB 60 CH	Cross Modulation dB 60 CH	Noise Figure @ 450 MHz dB Max	Package/ Style
Conventional Hybrids								
MHW5142A	14	60	+46	–74(31)	–61	–62	7	714/1
MHW5172A	17	60	+46	–74(31)	–60	–62	7	714/1
MHW5182A	18	60	+46	–72(31)	–61	–59	6.5	714/1
MHW5222A	22	60	+46	–72(31)	–60	–59	5.5	714/1
MHW5272A	27	60	+46	–68(31)	–59	–60	6.0	714/1
MHW5342A	34	60	+46	–68(31)	–59	–59	6.0	714/1
MHW5382A	38	60	+46	–64(31)	–59	–59	5.0	714/1
Power Doubling Hybrids								
MHW5185B	18	60	+46	–67(32)	–67	–67	7.0	714/1
MHW5225	22	60	+46	–69(31)	–62	–62	6.0	714/1
Feedforward Hybrids								
MFF124B	24	60	+46	–84(31)	–79	–75	10	825A/2

Table 5. 40–550 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB 77 CH	Composite Triple Beat dB 87 CH	Cross Modulation dB 77 CH	Cross Modulation dB 87 CH	Noise Figure @ 550 MHz dB Max	Package/ Style
Conventional Hybrids										
MHW6142	14	77	+44	–72(35)	–59	—	–62	—	7.5	714/1
MHW6172	17	77	+44	–72(35)	–59	—	–62	—	7	714/1
MHW6182	18	77	+44	–72(35)	–58	—	–62	—	7	714/1
MHW6222	22	77	+44	–66(35)	–57	—	–57	—	6	714/1
MHW6272	27	77	+44	–64(35)	–57	—	–57	—	6.5	714/1
MHW6342	34	77	+44	–64(35)	–57	—	–57	—	6.5	714/1
Power Doubling Hybrids										
MHW6185B	18	77	+44	–65(36)	–65	—	–68	—	7.5	714/1
MHW6205	20	77	+44	–60(36)	–64	—	–67	—	7.5	714/1
MHW6225	22	77	+44	–55(36)	–62	—	–60	—	7.0	714/1
Feedforward Hybrids										
MFF224B	24	77	+44	–86(35)	–75	—	–70	—	11	825A/2

(31)Channels 2 and M13 @ M22

(32)Composite 2nd order; V_{out} = +46 dBmV/ch

(35)Channels 2 and M30 @ M39

(36)Composite 2nd order; V_{out} = +44 dBmV/ch

CATV Distribution (continued)

Table 6. 40 – 600 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB: 85 CH	Composite Triple Beat dB: 87 CH	Cross Modulation dB: 85 CH	Cross Modulation dB: 87 CH	Noise Figure @ 600 MHz dB Max	Package/ Style
Conventional Hybrids										
MHW6182–6	18	87	+44	–56(36)	—	–57	—	–55	6	714/1
MHW6222–6	22	87	+44	–56(36)	—	–56	—	–56	6	714/1
MHW6272–6(46)	27	87	+44	–63(36)	—	–57	—	–55	6.5	714/1
MHW6292–6(46)	29	87	+44	–63(36)	—	–57	—	–55	6.5	714/1
Power Doubling Hybrids										
MHW6185–6A★	18	87	+44	–64(36)	—	–64	—	–66	7	714/1
MHW6205–6A★	20	87	+44	–63(36)	—	–63	—	–65	6.5	714/1
Feedforward Hybrids										
MFF324B	24	85	+44	–86(38)	–73	—	–68	—	12.5	825A/2

Table 7. 40 – 750 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB: 110 CH	Composite Triple Beat dB: 128 CH	Cross Modulation dB: 110 CH	Cross Modulation dB: 128 CH	Noise Figure @ 750 MHz dB Max	Package/ Style
Conventional Hybrids										
MHW7142	14	110	+40	–60(39)	– 62	—	– 66	—	8.0	714/1
MHW7182	18	110	+40	–62(39)	– 62	—	– 64	—	6.5	714/1
MHW7222	22	110	+40	–55(39)	– 60	—	– 60	—	7	714/1
MHW7242★	24	110	+40	–60(39)	– 60	—	– 60	—	7	714/1
MHW7272★	27	110	+40	–60(39)	– 60	—	– 60	—	6.5	714/1
MHW7292★	29	110	+40	–60(39)	– 60	—	– 60	—	6.5	714/1

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB: 110 CH	Cross Modulation dB: 110 CH	Noise Figure @ 750 MHz dB Max	Package/ Style
Power Doublers								
MHW7185A★	18.5	110	+44	–58(36)	–58	–65	8.5	714/1
MHW7205A★	20	110	+44	–56(36)	–57	–64	8.0	714/1
Feed Forward Hybrids								
MFF424B★	24	110	+44	–70(36)	–65(36)	—	13	825A/2

(36)Composite 2nd order; V_{out} = + 44 dBmV/ch
(38)Channels 2 and M39 @ M48
(39)Composite 2nd order; V_{out} = + 40 dBmV/ch
(46)To be introduced 2nd half of 1996.
★ New Product

CATV Distribution (continued)

Table 8. 40–860 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB: 110 CH	Composite Triple Beat dB: 128 CH	Cross Modulation dB: 110 CH	Cross Modulation dB: 128 CH	Noise Figure @ 860 MHz dB Max	Package/ Style
Conventional Hybrids										
MHW8142	14	128	+38	–60(40)	—	– 61	—	– 66	8.0	714/1
MHW8182	18	128	+38	–60(40)	—	– 60	—	– 60	7	714/1
MHW8222	22	128	+38	–60(40)	—	– 60	—	– 60	7.5	714/1
MHW8242★	24	128	+38	–60(40)	—	– 60	—	– 60	7.5	714/1
MHW8272★	27	128	+38	–60(40)	—	– 60	—	– 60	7.0	714/1
MHW8292★	29	128	+38	–56(40)	—	– 60	—	– 60	7.0	714/1
Power Doubling Hybrids										
MHW8185(46)	18.5	128	+40	–60(39)	—	– 62	—	– 65	8.5	714/1
MHW8205(46)	20	128	+40	–60(39)	—	– 61	—	– 65	8.5	714/1
Feedforward Hybrids										
MFF524B(46)	24	128	+40	–70(39)	—	– 70	—	—	12.0	825A/2

Table 9. 40–860 MHz Hybrids

Device	Gain dB Typ	Frequency MHz	V_{CC} Volts	2nd Order IMD @ V_{out} = 50 dBmV/ch Max	DIN45004B @ f=860 MHz dBμV Min	Noise Figure @ 860 MHz dB Max	Package/ Style
Conventional Hybrids							
CA901	17	40 – 860	24	–60	120	8	714P/2
CA901A	17	40 – 860	24	–64	120	8	714P/2
Power Doubling Hybrids							
CA922	17	40 – 860	24	–63	123	9.5	714P/2
CA922A	17	40 – 860	24	–67	123	9.5	714P/2
Hybrid Jumper							
CATHRU	0	1 – 1000	75 Ohm Broadband Hybrid Jumper				714V

Table 10. 40/1000 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB: 152 CH	Cross Modulation dB: 152 CH	Noise Figure @ 860 MHz dB Max	Package/ Style
Conventional Hybrids								
MHW9142	14	152	+38	–59(40)	–59	–63	8.5	714/1
MHW9182	18	152	+38	–59(40)	–59	–59	8.0	714/1
MHW9242★	24	152	+38	–59(40)	–58	–59	8	714/1

(39)Composite 2nd order; V_{out} = +40 dBmV/ch

(40)Composite 2nd Order; V_{out} = +38 dBmV/ch

(46)To be introduced 2nd half of 1996.

★New Product

Wideband Linear Amplifiers

Table 11. General Purpose Wideband Amplifiers

Device	Frequency Range MHz	Gain Min/Typ dB	Supply Voltage Vdc	Output Level 1 dB Compression MW/@ MHz	Noise Figure @ 250 MHz dB	Package/ Style
50–100 Ω Hybrids						
MHW591	1 – 250	34.5/36.5	13.6	700/100	5	714/1
MHW592	1 – 250	33.5/35	24	900/100	5	714/1
MHW593	10 – 400	33/34.5	13.6	600/200	5	714/1
MHW590	10 – 400	31.5/34	24	800/200	5	714/1

Table 12. Cellular Base–Station Pre–Drivers

These 50 ohm amplifiers are recommended for modern, multi–tone, CDMA and/or TDMA base–station pre–driver applications. Their high third–order intercept, tight phase control and excellent group delay characteristics make these amplifiers ideal for use in high–power feedforward loops. The MHL series is recommended for new designs.

Device	BW MHz	V_{CC} (Nom.) Volts	I_{CC} (Nom.) mA	Gain (Nom.) dB	Gain Flatness (Typ) ±dB	P_{1dB} (Typ) dBm	3rd Order Intercept (Typ) dBm/MHz	NF (Typ) dB	Case/ Style
MHL9125★	800–960	15	700	20	0.5	31	43	7.5	448/2
MHL9128★	800–960	28	400	20	0.5	31	43	7.5	448/1
MHL8115★	50–1000	15	700	17.5	1	30	41.5	8.5	448/2
MHL8118★	50–1000	28	400	17.5	1	30	41.5	8.5	448/1
MHL8015★	40–1000	15	380	18.5	1	26	38.5	7.5	448/2
MHL8018★	40–1000	28	210	18.5	1	26	38.5	7.5	448/1

Table 13. Standard 50 Ohm Linear Hybrids

This series of RF linear hybrid amplifiers have been optimized for wideband, 50 ohm applications. These amplifiers were designed for multi–purpose RF applications where linearity, dynamic range and wide bandwidth are of primary concern. Each amplifier is available in various package options. The MHL series utilizes a new case style that provides microstrip input and output connections.

Device	BW MHz	V_{CC} (Nom.) Volts	I_{CC} (Nom.) mA	Gain/Freq. (Typ) dB/MHz	Gain Flatness (Typ) ±dB	P_{1dB} (Typ) dBm	3rd Order Intercept Point/Freq. (Typ) dBm/MHz	NF/Freq. (Typ) dB/MHz	Case/ Style
CA2832C	1–200	28	435	35.5/100	0.5	33	47/200	5/200	714F/1
CA2830C	5–200	24	300	34.5/100	0.5	29	46/200	4.7/200	714F/1
CA2833C	5–200	24	300	34.5/100	0.5	29	46/200	4.7/200	714G/1
CA2818C	10–400	24	205	18.5/50	0.5	30	45/200	5/200	714F/1
CA2842C	10–400	24	230	22/100	0.5	30	44/300	4/100	714F/1
CA2810C	10–450	24	310	34/50	1.5	30	43/300	5/300	714F/1
CA5801(41)	50–1000	28	400	17.5/1000	1	30	41.5/1000	8.5/1000	714P/2
CA5800C(41)	10–1000	28	400	15.5/1000	1	30	40.5/1000	8.5/1000	714P/2
CA5815C(41)	10–1000	15	700	15.5/1000	1	30	40.5/1000	8.5/1000	714P/3
CA4800C(41)	10–1000	24	220	17.5/1000	1	26	38/1000	7.5/1000	714P/2
CA4812C(41)	10–1000	12	380	17.5/1000	1	26	38/1000	7.5/1000	714P/3
CA4815C(41)	10–1000	15	380	17.5/1000	1	26	38/1000	7.5/1000	714P/3
MHL9128★	800–960	28	400	20/900	0.5	31	43/879	7.5/960	448/1
MHL9125★	800–960	15	700	20/900	0.5	31	43/879	7.5/960	448/2
MHL8118★	50–1000	28	400	17.5/900	1	30	41.5/1000	8.5/1000	448/1
MHL8115★	50–1000	15	700	17.5/900	1	30	41.5/1000	8.5/1000	448/2
MHL8018★	40–1000	28	210	18.5/900	1	26	38.5/1000	7.5/1000	448/1
MHL8015★	40–1000	15	380	18.5/900	1	26	38.5/1000	7.5/1000	448/2

(41)Available in thin flange package (714T) by adding suffix “S” after part number, i.e. CA4800CS.

★ New Product

CRT Drivers

Table 1. Video Output Amplifiers

These complete hybrid amplifiers are specifically designed for CRT driver applications requiring high frequency response and high voltage, such as high resolution color graphics video monitors. Gold metallized die and substrates are used to ensure high reliability and improved ruggedness.

Device	V_{CC}(nom) Volts	Gain(42) (Typ) V/V	t_r/t_f (Typ)(43) nsec	3 dB BW (Typ)(43) MHz	Video Clock Freq. MHz	V_{out} (Max) Volts	Load	Package/Style
CR2428	60	12	2.0	145	290	50 P–P	6 to 20 pF	431A/1
MHW2528(45) ★	60	12	2.8	100	200	50 P–P	6 to 20 pF	445/1
MHW2728(45) ★	60	12	3.0	100	200	50 P–P	6 to 20 pF	455/1
MHW3628(45) ★	70	12	2.7	120	240	60 P–P	6 to 20 pF	455/1
CR3428	80	12	2.2	130	260	70 P–P	6 to 20 pF	431A/1
MHW3528(45) ★	80	12	2.7	120	240	70 P–P	6 to 20 pF	445/1
MHW3728(45) ★	80	12	2.5	120	240	70 P–P	6 to 20 pF	455/1
MHW3828(45) ★	70	12	2.5	125	250	60 P–P	6 to 20 pF	455/1
MHW3928(45) ★	90	12	2.3	125	250	80 P–P	6 to 20 pF	455/1

Fiber Optic Receivers

Table 1. 40–860 MHz Hybrids

Device	Hybrid Responsivity Min dB	Flatness dB	Maximum Distortion Specifications		Equivalent Input Noise	Package/ Style
			IMD 2(52) dB	IMD 3(52) dB	$pA/\sqrt{Hz}$ Max	
Fiber Optic Receiver Hybrids						
MHLW8000(46)	23.5	± 0.5	–70	–80	7.5	714U/1

(42)Insertion Gain; 50 Ω Source

(43)Capacitive Load 8.5 pF, Vout = 40 V P-P

(45)Triple Video Amplifiers

(46)To be introduced 2nd half of 1996.

(52)Two laser test with 0.5 mW optical power at 40% modulation index per lase; f1 = 373.25 MHz f2 = 415.25 MHz

★ New Product