电子元器件系列

RF and IF Products

In Brief . . .

While Motorola is a worldwide leader in 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

The RF Monolithic Integrated Circuits and the RF/IF Integrated Circuits products in this guide are divided into three major functional categories: RF Front End ICs, RF/IF Subsystem ICs and Frequency Synthesis. Each of these categories is further subdivided based on circuit functionality. This structure differentiates highly integrated subsystem ICs from fundamental circuit building blocks and discrete transistors.

The Small Signal Transistors, Medium Power Transistors, Power MOSFETs, Power Bipolar Transistors, Power Amplifier Modules and CATV Distribution Amplifiers are FIRST divided into major categories by power level. SECOND, within each category parts are listed by frequency band, except for small signal and medium power transistors, which are divided by application. Small signal transistor applications are low noise, linear amplifiers, switches, and oscillators. THIRD, within a frequency band, transistors are further grouped by operating voltage and, finally, output power.

To Replace Devices in an Existing Design

Call your local Motorola Sales Office or Distributor to determine Motorola's closest replacement device.

Applications Assistance

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

Access Data On–Line!

Use the Motorola SPS World Marketing Internet Server to access Motorola Semiconductor Product data at http://motorola.com/sps/ or http://motorola.com/sps/rf/. The SPS World Marketing Server provides you with instant access to data sheets, selector guide information, package outlines, on–line technical support and much more.

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RF and IF Products

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RF Front End ICs

Motorola's RF Front End integrated circuit devices provide an integrated solution for the personal communications market. These devices are available in plastic SO–8, SO–16, SOT–143, TSSOP–16, TSSOP–16EP, Micro–8, TSSOP–2EP, LQFP–48 or PFP–16 packages.

Evaluation Boards

Evaluation boards are available for RF Front End Integrated Circuits. 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.

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RF Front End ICs

RFICs

Downconverters

Device	RF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	LNA Gain dB (Typ)	LNA NF dB (Typ)	Mixer Conv. Gain dB (Typ)	Mixer NF dB (Typ)	Package	System Applicability
MC13142(18b)	DC to 1800	2.7 to 6.5	13.5	17	1.8	–3.0	12	SO–8	ISM, Cellular, PCS
MRFIC1502(18b)	1575	4.5 to 5.5	52	20	–	45	9.5	LQFP–48	GPS
MRFIC1814(18b)	1800 to 2000	2.7 to 4.5	10	17	2.5	8.0	10	TSSOP–16	DCS1800, PCS, PHS

Upconverters/Exciters

Device	RF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current mA (Typ)	Conv. Gain dB (Typ)	Output IP3 dBm (Typ)	Package	System Applicability
MRFIC0954(18b,46a)	800 to 1000	2.7 to 5.0	65	5.0	31	28	TSSOP–20EP	CDMA, TDMA, ISM
MRFIC1813(18b)	1700 to 2000	2.7 to 4.5	25	0.1	15	11	TSSOP–16	DCS1800, PCS
MRFIC1854(18b,46a)	1700 to 2000	2.7 to 5.0	70	5.0	31	23	TSSOP–20EP	CDMA, TDMA, PCS

Power Amplifiers

Device	Freq. Range MHz	Supply Volt. Range Vdc	Saturated P_{out} dBm (Typ)	PAE % (Typ)	Gain P_{out}/P_{in} dB (Typ)	Package	System Applicability
MRFIC0913(18e)	800 to 1000	2.7 to 7.5	35	50	25	PFP–16	GSM
MRFIC0917(18e)	800 to 1000	2.7 to 5.5	34.5	45	22.5	PFP–16	GSM
MRFIC0919(18b,46a)	800 to 1000	3.0 to 5.5	35.3	48	32.3	TSSOP–16EP	GSM
MRFIC1805(18b)	1500 to 2200	2.7 to 5.0	25	28	20	TSSOP–16	PHS, DECT, PCS
MRFIC1807(18b)	1500 to 2200	3.0 to 5.0	26.8	35	8.0	SO–16	DECT, PCS
MRFIC1817(18e)★	1700 to 2000	2.7 to 5.0	33.5	42	30.5	PFP–16	DCS1800, PCS
MRFIC1818(18e)	1700 to 2000	2.7 to 6.0	34.5	42	31.5	PFP–16	DCS1800, PCS
MRFIC1819(18b,46a)	1700 to 2000	3.0 to 5.0	33	40	27	TSSOP–16EP	DCS1800, PCS
MRFIC1856(18b,46a)	800 to 1000	3.0 to 5.6	32	50	32	TSSOP–20EP	TDMA, CDMA, AMPS
	1700 to 2000		30	35	30		TDMA, CDMA, PCS
MRFIC2006(18b)	500 to 1000	1.8 to 4.0	15.5	25	23	SO–8	Cellular, ISM, CT2

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

RF Building Blocks

Amplifiers

Device	RF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current μA (Typ)	Small Signal Gain dB (Typ)	Output IP3 dBm (Typ)	NF dB (Typ)	Package	System Applicability
MC13144(18b)	100 to 2000	1.8 to 6.0	8.5	1	17	–5.0	1.4	SO–8	ISM, PCS, Cellular
MRFIC0915(18c)★	100 to 2500	2.7 to 5.0	2.0	–	16.2	4.0	1.9	SOT–143	ISM, PCS, Cellular
MRFIC0916(18c)	100 to 2500	2.7 to 5.0	4.7	–	18.5	11	1.9	SOT–143	ISM, PCS, Cellular
MRFIC0930(18b)★	800 to 1000	2.7 to 4.5	8.5	20	19	10	1.7	SO–8	GSM, AMPS, ISM
MRFIC1808DM (18g)★	1700 to 2100	2.7 to 4.5	5.0	8.0	18	13	1.6	Micro–8	DCS1800, PCS
MRFIC1830 (18b,46a)	1700 to 2100	2.7 to 4.5	9.0	20	18.5	8.5	2.1	Micro–8	DCS1800, PCS
MRFIC1501(18b)	1000 to 2000	3.0 to 5.0	5.9	–	18	10	1.1	SO–8	GPS

Mixers

Device	RF Freq. Range MHz	Supply Volt. Range Vdc	Supply Current mA (Typ)	Standby Current μA (Typ)	Conv. Gain dB (Typ)	Input IP3 dBm (Typ)	Package	System Applicability
MC13143(18b)	DC to 2400	1.8 to 6.0	4.1	–	–2.6	16	SO–8	ISM, PCS, Cellular

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

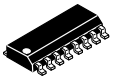
(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

RF Front End Integrated Circuit Packages

CASE 318A–05
(SOT–143)

CASE 751–06
(SO–8)



CASE 751B–05
(SO–16)

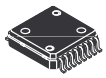
CASE 846A–02
(Micro–8)

CASE 932–02
(LQFP–48)

CASE 948C–03
(TSSOP–16)

CASE 948L–01
(TSSOP–16EP)

CASE 948M–01
(TSSOP–20EP)



CASE 978–02
(PFP–16)

RF/IF Subsystems

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RF/IF Subsystems

Cordless Phone Subsystem ICs

Device	V_{CC}	I_{CC} (Typ)	Dual Conversion Receiver	Universal Dual PLL	Compander and Audio Interface	CVSD Compatible	Low Battery Detect	Notes	Suffix/ Package
MC13109A	2.0 to 5.5 V	Active Mode 6.7 mA Inactive Mode 40 µA	✓	✓	✓	–	✓	CT–0	FB/848B, FTA/932
MC13110A MC13110B	2.7 to 5.5 V	Active Mode 8.5 mA Inactive Mode 15 µA	✓	✓	✓	–	✓	CT–0	FB/848B, FTA/932
MC13111A MC13111B	2.7 to 5.5 V	Active Mode 8.5 mA Inactive Mode 15 µA	✓	✓	✓	–	✓	CT–0	FB/848B, FTA/932
MC13145★	2.7 to 6.5 V	Active Mode 27 mA Inactive Mode 10 µA	✓	–	–	✓	–	Receiver with coilless demod CT–900	FTA/932
MC13146★	2.7 to 6.5 V	Active Mode 18 mA Inactive Mode 10 µA	–	–	–	✓	–	Transmitter with VCO CT–900	FTA/977
MC33410 (46a)	2.7 to 5.5 V	Active Mode 13 mA Inactive Mode 10 µA	✓	✓	–	✓	✓	Digital Baseband CT–900	FTA/932
MC33411A★ MC33411B★	2.7 to 5.5 V	Active Mode 15 mA Inactive Mode 10 µA	✓	✓	✓	–	✓	Analog Baseband CT–900	FTA/932

Receivers

Device	V_{CC}	I_{CC} (Typ)	Sensitivity (Typ)	RF Input	IF	Mute	RSSI	Max Data Rate	Notes	Suffix/ Package
MC2800(46a)	1.1 to 3.0 V	1.5 mA	–110 dBm	75 MHz	455 kHz	–	✓	>1.2 kb	Pager Applications	FTA/873C
MC3356	3.0 to 9.0 V	20 mA	30 µV	150 MHz	10.7 MHz	✓	✓	500 kb	Includes front end mixer/L.O.	P/738, DW/751D
MC3361C	2.0 to 8.0 V	2.8 mA	2.6 µV	60 MHz	455 kHz	✓	–	>4.8 kb	Squelch and Scan	P/648, D/751B
MC3371	2.0 to 9.0 V	6.0 mA	1.0 µV	100 MHz			✓		RSSI	P/648, D/751B, DTB/948F
MC3372									RSSI, Ceramic Quad Detector/Resonator	
MC3374	1.1 to 3.0 V	1.5 mA	0.5 µV	75 MHz		–	–		Low Battery Detect	FTB/873

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

Receivers (continued)

Device	V_{CC}	I_{CC} (Typ)	Sensitivity (Typ)	RF Input	IF	Mute	RSSI	Max Data Rate	Notes	Suffix/ Package
MC13135	2.0 to 6.0 V	4.0 mA	1.0 μV	200 MHz	10.7 MHz/ 455 kHz	–	✓	>4.8 kb	Voltage Buffered RSSI, LC Quad Detector	DW/751E, P/724
MC13136									Voltage Buffered RSSI, Ceramic Quad Detector	DW/751E
MC13150	2.5 to 6.0 V	1.7 mA	1.0 μV	500 MHz		✓	✓ 110 dB	>9.6 kb	Coilless Detector with Adjustable Bandwidth	FTB/873, FTA/977
MC13156	2.0 to 6.0 V	5.0 mA	2.0 μV	500 MHz	21.4 MHz	–	✓	500 kb	CT–2 FM/Demodulator	DW/751E, FB/873
MC13158	2.0 to 6.0 V	6.0 mA		950 MHz				>1.2 Mb	FM IF/Demodulator with split IF for DECT	FTB/873

IFs

Device	V_{CC}	I_{CC} (Typ)	Sensitivity (Typ)	IF	Mute	RSSI	Max Data Rate	Notes	Suffix/ Package
MC13055	3–12 V	25 mA	20 μV	40 MHz	✓	✓	2.0 Mb	Wideband Data IF, includes data shaper	D/751B
MC13155	3–6 V	7.0 mA	100 μV	250 MHz	–		10 Mb	Video Speed FM IF	D/751B

Transmitters

Device	V_{CC}	I_{CC} (Typ)	P_{out}	Max RF Freq Out	Max Mod Freq	Notes	Suffix/ Package
MC13176	2.0 to 5.0 V	40 mA	80 dBm	1.0 GHz	5.0 MHz	$f_{out} = 32 \times f_{ref}$, includes power down function	D/751B

(46) To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

Miscellaneous Functions

ADCs/DACs

Device	Function	I/O Format	Resolution	Number of Analog Channels	On–Chip Oscillator	Other Features	Suffix/ Package
MC144110	DAC	Serial	6 Bits	6	–	Emitter–Follower Outputs	P/707, DW/751D
MC144111				4			P646, DW/751G
MC145050	ADC		10 Bits	11	–	Successive Approximation	P/738, DW/751D
MC145051					✓		
Mc145053				5			P/646, D/751A

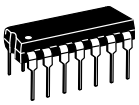
Encoders/Decoders

Device	Function	Number of Address Lines	Maximum Number of Address Codes	Number of Data Bits	Operation	Suffix/ Package
MC145026	Encoder	Depends on Decoder	Depends on Decoder	Depends on Decoder	Simplex	P/648, D/751B
MC145027	Decoder	5	243	4	Simplex	P/846, DW/751G
MC145028		9	19,683	0	Simplex	

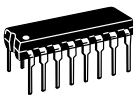
(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

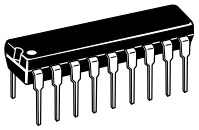
RF/IF Subsystems Packages



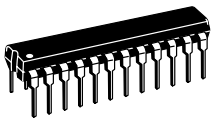
CASE 646
P SUFFIX



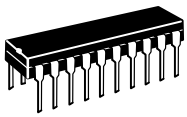
CASE 648
P SUFFIX



CASE 707
P SUFFIX



CASE 724
P SUFFIX

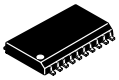


CASE 738
P SUFFIX

CASE 751
D SUFFIX

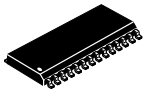
CASE 751A
D SUFFIX

CASE 751B
D SUFFIX



CASE 751D
DW SUFFIX

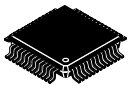
CASE 751E
DW SUFFIX



CASE 751F
DW SUFFIX

CASE 751G
DW SUFFIX

CASE 846
P SUFFIX



CASE 848B
FB SUFFIX

CASE 873
FB, FTB SUFFIX

CASE 873C
FTA SUFFIX

CASE 932
FTA SUFFIX

CASE 948D
DT SUFFIX

CASE 948F
DTB SUFFIX

CASE 976
FTB SUFFIX

CASE 977
FTA SUFFIX

Frequency Synthesis

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Frequency Synthesis

PLL Synthesizers

Frequency (MHz)	Supply Voltage (V)	Nominal Supply Current (mA)	Phase Detector	Standby	Interface	Device	Suffix/ Case
20 @ 5.0 V	3.0 to 9.0	7.5 @ 5 V	Single–ended 3–state, double–ended	No	Parallel	MC145151–2	DW/751F
			Double–ended			MC145152–2	DW/751F
			Single–ended 3–state, double–ended		Serial	MC145157–2	DW/751G
						MC145158–2	DW/751G
60 @ 3.0 V	2.5 to 5.5	3 @ 3 V	Two single–ended 3–state	Yes		MC145162*	P/648, D/751B
85 @ 3.0 V	2.5 to 5.5	3 @ 3 V			Serial	MC145162–1*	D/751B
100 @ 3.0 V 185 @ 5.0 V	2.7 to 5.5	2 @ 3 V 6 @ 5 V	Single–ended 3–state, double–ended	No		MC145170–2	P/648, D/751B, DT/948C
550, 60	1.8 to 3.6	3	Loop 1 = Current source/sink/float Loop 2 = Three–state	Yes		MC145181*(46a)	FTA/873C
1000	2.7 to 5.5	4.25	Current source/sink/float	No	Parallel	MC12181	D/751B
1100	4.5 to 5.5	7 @ 5 V	Current source/sink/float, double–ended	Yes	Serial	MC145191	F/751J, DT/948D
1100	2.7 to 5	6 @ 2.7 V				MC145192	F/751J, DT/948D
1100	2.7 to 5.5	12	Two current source/sink/float, double–ended			MC145220*	F/803C, DT/948D
1200, 550	1.8 to 3.6	4	Loop 1 = Current source/sink/float Loop 2 = Three–state			MC145225*(46a)	FTA/873C
2000	4.5 to 5.5	12 @ 5 V	Current source/sink, double–ended			MC145201	F/751J, DT/948D
2000	2.7 to 5.5	4 @ 3 V				MC145202	F/751J, DT/948D
2200, 550	1.8 to 3.6	5	Loop 1 = Current source/sink/float Loop 2 = Three–state			MC145230*(46a)	FTA/873C
2500	2.7 to 5.5	9.5	Current source/sink/float with dual outputs	No		MC12210	D/751B, DT/948E
2800	4.5 to 5.5	3.5	Current source/sink/float		None	MC12179	D/751

*Dual PLL

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

NOTE: Evaluation kits available for the MC145191, MC145192, MC145201, MC145202, and MC145220. Order part number MC145_ _ _EVK. The MC145230EVK development system can be used with the MC145181, MC145225, or MC145230. For the MC145181, the user must supply the VCOs.

PLL Building Blocks

Prescalers

Frequency (MHz)	Divide Ratios	Single or Dual Modulus	Supply Voltage (V)	Supply Current (mA)	Features	Device	Suffix/ Case
225	32/33	Dual	4.5 to 5.5, 5.5 t0 9.5	7.8 max		MC12015	D/751
225	40/41	Dual	4.5 to 5.5, 5.5 t0 9.5	7.8 max		MC12016	D/751
225	64/65	Dual	4.5 to 5.5, 5.5 t0 9.5	7.8 max		MC12017	D/751
225	20/21	Dual	4.5 to 5.5	7.5 max		MC12019	D/751
1100	8/9. 16/17	Dual	4.5 to 5.5	5.3 max (unloaded)		MC12026A	D/751
1100	127/128, 255/256	Dual	4.5 to 5.5	6.5 max (at 5.0 V)		MC12038A	D/751
1100	64/65, 128/129	Dual	2.7 to 5.5	2.0 max	Low Power	MC12052A	D/751
1100	64/65, 128/129	Dual	2.7 to 5.5	2.5 max	Low Power, Standby	MC12053A	D/751
1100	126/128, 254/256	Dual	2.7 to 5.5	2.0 max	Low Power	MC12058	D/751
1100	2, 4, 8	Single	2.7 to 5.5	4.5 max	Standby	MC12093	D/751
2000	64/65, 128/129	Dual	2.7 to 5.5	2.6 max	Low Power	MC12054A	D/751
2500	2, 4	Single	2.7 to 5.5	14.0 max	Standby	MC12095	D/751
2800	64, 128, 256	Single	4.5 to 5.5	11.5 max		MC12079	D/751
2800	64, 128	Single	4.5 to 5.5	14.5 max		MC12089	D/751

Voltage Control Oscillators

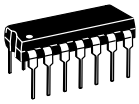
Frequency (MHz)	Supply Voltage (V)	Features	Device	Suffix/ Case
1300	2.7 to 5.5	Two high drive open collector outputs (Q, QB), Adjustable output amplitude	MC12147	D/751
1100	5.0	Single load ECL type output	MC12148	D/751
1300	2.7 to 5.5	Two high drive open collector outputs (Q, QB), Adjustable output amplitude, Low drive output for prescaler	MC12149	D/751

Phase–Frequency Detectors

Frequency (MHz)	Supply Voltage (V)	Features	Device	Suffix/ Case
800 (Typ)	4.75 to 5.5	MECL10H compatible	MCH12140	D/751
800 (Typ)	4.2 to 5.5	100K ECL compatible	MCK12140	D/751

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

RF/IF Integrated Circuits Packages

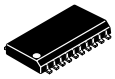


CASE 646
P SUFFIX

CASE 751
D SUFFIX

CASE 751B
D SUFFIX

CASE 751G
DW SUFFIX



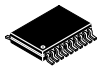
CASE 751J
F SUFFIX

CASE 803C
F SUFFIX

CASE 873C
FTA SUFFIX

CASE 948C
DT SUFFIX

CASE 948D
DT SUFFIX



CASE 948E
DTB SUFFIX

Motorola RF Discrete Transistors

Motorola offers 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 and ceramic that are microstrip circuit compatible or surface mountable. Many are designed for automated assembly equipment.
Major sub–headings are Small Signal, Medium Power, Power MOSFETs and Bipolar Transistors.

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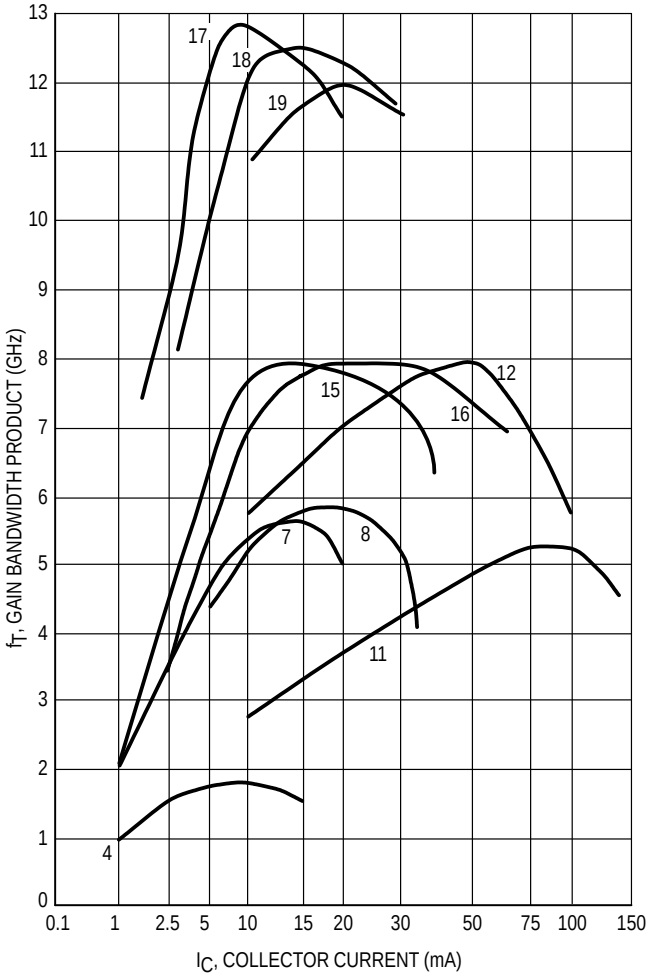
Motorola RF Small Signal Transistors

Motorola's broad line of RF Small Signal Transistors includes NPN 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. Most of these transistors are fully characterized with s–parameters.

RF Small Signal Transistor Gain Characteristics



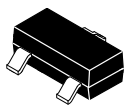
Curve numbers apply to transistors listed in the subsequent tables.

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.

Plastic Packages

Table 1. Plastic

Device	Gain–Bandwidth @ f_T Typ GHz	@ I_C mA	Curve No. Page 5.8–18	NF_{min} @ f Typ dB	MHz	Gain @ f Typ dB	MHz	Maximum Ratings $V_{(BR)CEO}$ Volts	I_C mA	Package
Case 318–08/6 — SOT–23										
MMBR5031LT1(18c)	1.0	5	–	2.5	450	17	450	10	20	
BFS17LT1(18c)	1.3	25	–	–	–	–	–	15	–	
BFR92ALT1(18c)	4.5	14	–	–	–	15	–	15	25	
MMBR901LT1(18c)	4.0	15	7	1.9	1000	12	1000	15	30	
MMBR901LT3(18d)	4.0	15	7	1.9	1000	12	1000	15	30	
BFR93ALT1(18c)	3.4	30	–	2.5	30	–	–	12	35	
MMBR5179LT1(18c)	1.4	5.0	4	–	–	15	200	12	50	

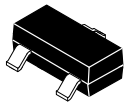
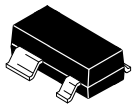
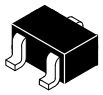
(17)PNP

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

★New Product

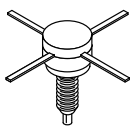
Selection by Package (continued)

Table 1. Plastic (continued)

Device	Gain–Bandwidth @ f_T Typ GHz	Gain–Bandwidth @ I_C mA	Curve No. Page 5.8–18	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 318–08/6 — SOT–23 (continued)										
MMBR941LT1(18c)	8.0	15	15	2.1	2000	8.5	2000	10	50	
MMBR941LT3(18d)	8.0	15	15	2.1	2000	8.5	2000	10	50	
MMBR941BLT1(18c)	8.0	15	15	2.1	2000	8.5	2000	10	50	
MMBR911LT1(18c)	6.0	30	8	2.0	500	17	500	12	60	
MMBR571LT1(18c)	8.0	50	12	2.0	500	16.5	500	10	80	
Case 318A/1 — SOT–143										
MRF5711LT1(18c)	8.0	50	12	1.6	1000	13.5	1000	10	70	
MRF9411LT1(18c)	8.0	15	15	2.1	2000	9.5	2000	10	50	
MRF5811LT1(18c)	5.0	75	11	2.0	500	18.4	500	18	200	
MRF9511LT1(18c)	8.0	30	16	2.1	2000	9.0	2000	10	100	
Case 419/3 — SC–70/SOT–323										
MRF917T1(18c)	6.0	20	8	2.3	1000	10	1000	12	60	
MRF577T1(18c)	7.0	40	12	1.5	1000	10	1000	10	80	
MRF927T1(18c)	8.0	5.0	14	1.7	1000	9.8	1000	10	10	
MRF927T3(18d)	8.0	5.0	14	1.7	1000	9.8	1000	10	10	
MRF947T1(18c,d)	8.0	15	15	2.1	2000	10.5	1500	10	50	
MRF947T3(18d)	8.0	15	15	2.1	2000	10.5	1500	10	50	
MRF947AT1(18c)	8.0	15	15	2.1	2000	10.5	1500	10	50	
MRF947BT1(18c,d)	8.0	15	15	2.1	2000	10.5	1500	10	50	
MRF957T1(18c)	9.0	30	16	2.0	2000	9.0	1500	10	100	
MRF1027T1(18c)	12	10	17	1.1	1000	14	1000	5.0	25	
MRF1047T1(18c)	12	15	18	1.0	1000	13	1000	5.0	45	
MRF1057T1(18c)	12	20	19	1.1	1000	12	1000	5.0	70	
Case 463/1 — SC–90/SC–75										
MRF579T1(18c)	8.0	40	12	1.5	1000	12	1000	–	80	
MRF949T1(18c)	9.0	15	15	1.5	1000	14	1000	–	50	
MRF959T1(18c)	9.0	30	15	1.6	1000	8.0	1000	–	100	

Ceramic SOE Case

Table 2. Ceramic SOE Case

Device	Gain–Bandwidth @ f_T Typ GHz	Gain–Bandwidth @ I_C mA	Curve No. Page 5.8–18	NF @ f Typ dB	NF @ 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	3.0	500	13	500	15	200	

(17)PNP

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

★New Product

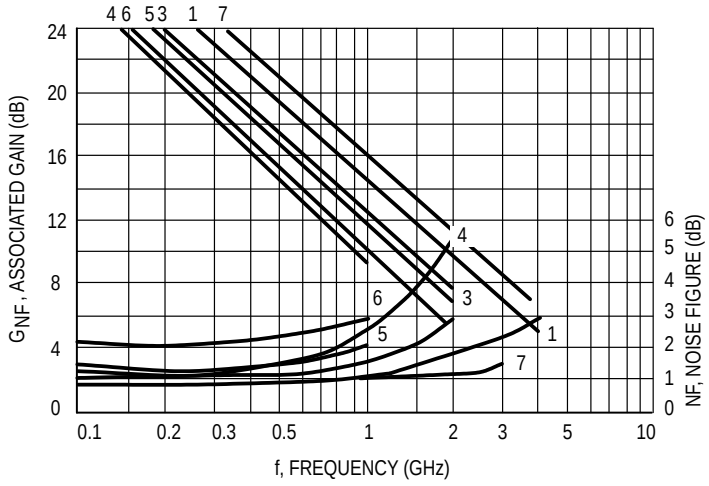
Selection by Application

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	3	4	5	6	7
	SOT–23	318–08/6	MMBR941LT1 MMBR941LT3 MMBR941BLT1 MMBR951LT1	MMBR571LT1	—	MMBR901LT1 MMBR901LT3	MMBR911LT1	MMBR911LT1
	SC–70/ SOT–323	419/3	MRF917T1 MRF577T1 MRF927T1 MRF927T3 MRF947AT1 MRF947T1 MRF947T3 MRF947BT1 MRF957T1	—	—	—	—	MRF1027T1 MRF1047T1 MRF1057T1
	SC–70ML/ SOT–363	419B/ 16, 17	MRF2947AT1 MRF2947RAT1	—	—	—	—	—
	SC–90/ SC–75	463/1	MRF579T1 MRF949T1 MRF959T1	—	—	—	—	—
	SOT–143	318A/1	MRF9411LT1 MRF9511LT1	MRF5711LT1	MRF5811LT1	—	—	—

(17)PNP



Gain and Noise Figure versus Frequency

Selection by Application (continued)

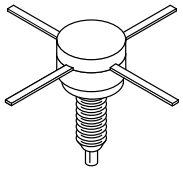
Table 4. CATV, MATV and Class A Linear

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	3rd Order IMD dBc	Output Level dBmV		
MMBR5179LT1(18c)	6/5	1500	4/450			12	318–08/6
MMBR5031LT1(18c,d)	6/5	2000	1.9/450			10	318–08/6
MRF587	15/90	5500	3/500	–72	+50	17	244A/1

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

RF Small Signal Transistors Packages



CASE 244A
STYLE 1

CASE 318–08
STYLE 6
(SOT–23)

CASE 318A
STYLE 1, 11
LOW PROFILE
(SOT–143)

CASE 419
STYLE 3
(SC–70/SOT–323)

CASE 419B
STYLE 16, 17
(SC–70ML/SOT–363)

CASE 463
STYLE 1
(SC–90/SC–75)

Motorola RF Medium Power Transistors

RF Medium Power Transistors are used in portable transmitter applications and low voltage drivers for higher power devices. They can be used for analog cellular, GSM and the newer digital handheld cellular phones. GaAs, LDMOS and Bipolar devices are available. RF Medium Power Transistors are supplied in Motorola's high performance PLD line of surface mount power RF packages. Other applications include talkback pagers, wireless modems and LANs, cable modems, highspeed drivers and instrumentation.

Discrete Wireless Transmitter Devices

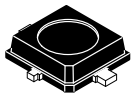
Device	Freq. MHz	V_{DD} V	Typical Output Power dBm	Typical Drain Eff. %	Typical Gain dB	Semiconductor Technology	Package
MRF9382T1 (18f, 46a)	900	6.0	36.5	65	10.5	LDMOS	PLD–1
MRF9482T1 (18f, 46a)	900	4.8	36.0	65	10	LDMOS	PLD–1

(18) Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

(46) To be introduced: a) 4Q98; b) 1Q99; c) 2Q99

★New Product

RF Medium Power Transistors Packages



CASE 449
(PLD–1)

Motorola RF High Power Transistors

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 150 MHz HF/SSB – Vertical MOSFETs

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 d_3 dB	Typical IMD d_{11} dB	θ_{JC} °C/W	Package/Style
V_{DD} = 28 Volts, Class AB							
MRF171A★	30	0.45	20	–32	—	1.52	211–07/2
MRF140	150	4.7	15	–30	–60	0.6	211–11/2
V_{DD} = 50 Volts, Class AB							
MRF148A	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 2. To 225 MHz VHF AM/FM – Vertical MOSFETs

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
MRF171A★	45	0.56	20/150	65	1.52	211–07/2
MRF173	80	4	13/150	65	0.8	211–11/2
MRF174	125	8.3	11.8/150	60	0.65	211–11/2
MRF141	150	15	10/175	55	0.6	211–11/2
MRF141G	300	15	13/175	55	0.35	375/2
V_{DD} = 50 Volts, Class AB						
MRF151	150	7.5	13/175	45	0.6	211–11/2
MRF151G	300	7.5	16/175	55	0.35	375/2

★New Product

Table 3. 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 – Vertical MOSFETs						
MRF158	2	0.035	17.5/500	52	13.2	305A/2
MRF160	4	0.08	17/500	55	7.2	249/3
MRF166C	20	0.62	16/500	55	2.5	319/3
MRF166W	40	1	13/500	50	1.0	412/1
MRF177	100	6.4	12/400	60	0.65	744A/2
MRF275L★	100	13.2	8.8/500	55	0.65	333/2
MRF275G	150	10.7	11.2/500	55	0.44	375/2

Table 4. 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 12.5/7.5 volt mobile, portable 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
VHF & UHF, V_{DD} = 7.5 Volts, Class AB, Land Mobile Radio – LDMOS Die						
MRF1512(46a)	3	0.3	10.5/520	55	10	449/1
MRF1512T1(18f,46a)	3	0.3	10.5/520	55	10	449/1
MRF1517(46a)	8	0.6	11/520	55	2.0	466/1
MRF1517T1(18f,46a)	8	0.6	11/520	55	2.0	466/1
VHF & UHF, V_{DD} = 7.5/12.5 Volts, Class AB, Land Mobile Radio – LDMOS Die						
MRF1513(46a)	3	0.3	11/520	55	2.0	466/1
MRF1513T1(18f,46a)	3	0.3	11/520	55	2.0	466/1
MRF1511(46a)	8	0.6	11.5/175	55	2.0	466/1
MRF1511T1(18f,46a)	8	0.6	11.5/175	55	2.0	466/1
VHF & UHF, V_{DD} = 12.5 Volts, Class AB, Land Mobile Radio – LDMOS Die						
MRF1518(46a)	8	0.3	11/520	55	2.0	466/1
MRF1518T1(18f,46a)	8	0.3	11/520	55	2.0	466/1

Table 5. To 1.0 GHz – Lateral MOSFETs

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
470 – 1000 MHz, V_{DD} = 28 Volts, Class AB – LDMOS Die						
MRF373★	60	2.7	14.7/860	56	1.0	360B/1
MRF373S★	60	2.7	14.7/860	56	0.75	360C/1
MRF374(46a)	120	5.5	13.5/860	60	0.5	375F/1

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

Table 5. To 1.0 GHz – Lateral MOSFETs (continued)

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
800 – 1.0 GHz, V_{DD} = 26 Volts, Class AB – LDMOS Die						
MRF6522–5R1(18a,46b)	5	0.06	18/960	53	15	458A/1
MRF6522–10R1(18a,46b)	10	0.16	17.5/960	55	6.0	458A/1
MRF6522–70(46a)	70	1.8	16/921–960	55	1.1	465D/1
MRF187(25,46a)	85	4.3	13/880	33	0.7	465/1
MRF187S(25,46a)	85	4.3	13/880	33	0.7	465A/1
MRF188(25,46a)	170	8.52	13/880	34	0.35	375D/2
MRF188S(25,46a)	170	8.52	13/880	34	0.35	375E/2
800 – 1.0 GHz, V_{DD} = 28 Volts, Class AB – LDMOS Die						
MRF181SR1(18a,25,46b)	15	0.16	17/945	35	3.6	458/1
MRF181ZR1(18a,25,46b)	15	0.16	17/945	35	3.6	458A/1
MRF182	30	1.2	14/945	58	1.75	360B/1
MRF182S(18a)	30	1.2	14/945	58	1.75	360C/1
MRF183(25)	45	2.3	13.5/945	38	1.5	360B/1
MRF183S(18a,25)	45	2.3	13.5/945	38	1.5	360C/1
MRF184	60	1.9	13.5/945	60	1.1	360B/1
MRF184S(18a)	60	1.9	13.5/945	60	1.1	360C/1
MRF6522–60(46a)	60	2.0	14/960	60	1.1	360B/1
MRF185(3)	85	3.4	14/960	53	0.7	375B/2
MRF186(3,25,46a)	120	7.6	12/945	53	0.6	375B/2

Table 6. To 2.1 GHz – Lateral MOSFETs

Device	P_{out} Watts	Class	Bias Point Vdc/mA	Gain (Typ)/Freq dB/MHz	θ_{JC} °C/W	Package/Style
1805 – 1990 MHz, V_{DD} = 26 Volts – LDMOS Die (GSM1800, GSM1900 and PCS TDMA)						
MRF18060A(46b,52a)	60	AB	26/500	12/1805–1880	0.75	465/1
MRF18060B(46b,52a)	60	AB	26/500	11/1930–1990	0.75	465/1
MRF18090A(46b,52a)	90	AB	26/750	12/1805–1880	0.7	465B/1
MRF18090B(46b,52a)	90	AB	26/750	11/1930–1990	0.7	465B/1
1.9 GHz, V_{DD} = 26 Volts – LDMOS Die (PCS CDMA)						
MRF19090(25,46a)	90	AB	26/750	11.5/1990	0.7	465B/1
MRF19090S(18a,25,46a)	90	AB	26/750	11.5/1990	0.7	465C/1
1.9 GHz, V_{DD} = 28 Volts – LDMOS Die						
MRF19030(25,46b,52a)	30	AB	28/250	12/1990	2.0	465E/1
MRF19030S(25,46b,52a)	30	AB	28/250	12/1990	2.0	465F/1
MRF19060(25,46a)	60	AB	28/500	13/1990	0.75	465/1
MRF19060S(25,46a)	60	AB	28/500	13/1990	0.75	465A/1
MRF19120(3,25,46a)	120	AB	28/1000	11.5/1990	0.55	375D/2
MRF19120S(3,25,46a)	120	AB	28/1000	11.5/1990	0.55	375E/2

(3)Internal Impedance Matched Push-Pull Transistors

(18)Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

(25)Two–tone Performance, Power is PEP

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

(52)Engineering samples available: a) 1Q99; b) 2Q99

Table 6. To 2.1 GHz – Lateral MOSFETs (continued)

Device	P_{out} Watts	Class	Bias Point Vdc/mA	Gain (Typ)/Freq dB/MHz	θ_{JC} °C/W	Package/Style
2.0 GHz, V_{DD} = 26 Volts – LDMOS Die						
MRF281S[25,46b]	4	A, AB	26/25	13.6/2000	8.75	458/1
MRF281Z[25,46b]	4	A, AB	26/25	13.6/2000	8.75	458A/1
MRF282S[25]	10	A, AB	26/75	12.5/2000	2.9	458/1
MRF282Z[25]	10	A, AB	26/75	12.5/2000	2.9	458A/1
MRF284R1[18a,25]	30	A, AB	26/200	10.5/2000	2.0	360B/1
MRF284SR1[18a,25]	30	A, AB	26/200	10.5/2000	2.0	360C/1
MRF286[25,46a]	60	A, AB	26/500	10.6/2000	.73	465/1
MRF286S[25,46a]	60	A, AB	26/500	10.6/2000	.73	465A/1
2.1 GHz, V_{DD} = 28 Volts – LDMOS Die						
MRF21030[25,46b]	30	AB	28/250	12/2170	2.0	465E/1
MRF21030S[25,46b]	30	AB	28/250	12/2170	2.0	465F/1
MRF21060[25,46a]	60	AB	28/500	13/2170	0.75	465/1
MRF21060S[25,46a]	60	AB	28/500	13/2170	0.75	465A/1
MRF21090[25,46a]	90	AB	28/800	10.5/2170	0.7	465B/1
MRF21090S[25,46a]	90	AB	28/800	10.5/2170	0.7	465C/1
MRF21120[3,25,46a]	120	AB	28/1000	11.5/2170	0.55	375D/2
MRF21120S[3,25,46a]	120	AB	28/1000	11.5/2170	0.55	375E/2

[3]Internal Impedance Matched Push-Pull Transistors

[18]Tape and Reel Packaging Option 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; f) T1 = 1,000 units; g) R2 = 4,000 units; h) R1 = 1,000 units.

[25]Two–tone Performance, Power is PEP

[46]To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

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 base stations, 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.

UHF Transistors

Table 1. 100 – 500 MHz Band

Designed for UHF military and commercial aircraft radio transmitters.

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					
MRF392(3)	125	19.8	8/400	0.7	744A/1
MRF393(3)	100	18	7.5/500	0.7	744A/1

900 MHz Transistors

Table 2. 900 – 960 MHz Band

Designed specifically for the 900 MHz mobile radio band, these devices offer superior gain, ruggedness, stability and broadband operation. Devices are for mobile and base station applications.

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						
MRF857S	2.1 (CW)	A	0.4	12.5/900	8.4	305D/1
MRF858S	3.6 (CW)	A	0.29	11/900	6.9	319A/2
MRF891S	5	AB	0.63	9/900	7	319A/2
MRF859S	6.5 W (CW)	A	0.46	11.5/900	3.9	319A/2
MRF897(3)	30	AB	3	10/900	1.7	395B/1
MRF897R(3)	30	AB	3	10.5/900	1.7	395E/1
MRF898(2)	60 (CW)	C	12	7/900	1	333A/1
V_{CC} = 26 Volts — Si Bipolar						
MRF6409	20	AB	26/50	10/960	3.8	319/2
MRF6414	50	AB	26/200	8.5/960	1.3	333A/2
MRF899(3)	150	AB	24	8/900	0.8	375A/1

1.5 GHz Transistors

Table 3. 1600 – 1640 MHz Band

Device	P_{out} Output Power Watts	Class	η Eff. (Min) %	Gp (Min)/Freq. Power Gain dB/MHz	θ_{JC} °C/W	Package/Style
MRF16006	6	C	40	7.4/1600	6.8	395C/2
MRF3010	10	AB	45	9.5/1600	3.6	360B/1 (LDMOS)
MRF16030	30	C	40	7.5/1600	1.7	395C/2

(2)Internal Impedance Matched

(3)Internal Impedance Matched Push-Pull Transistors

Microwave Transistors

Table 4. 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
V_{CC} = 50 Volts					
MRF10150	150	15	10(7)	0.25	376B/1
MRF10350	350	44	9(7)	0.11	355E/1
MRF10502★	500	63	9(7)	0.12	355J/1

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 to 2.0 GHz.

Table 5. UHF Ultra Linear For TV Applications

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

Device	P_{ref} (Min) Watts	Gp (Min)/Freq. Small Signal Gain dB/MHz	3 Tone IMD(8) dB	θ_{JC} °C/W	Package/Style
V_{CC} = 28 Volts, Class AB					
TPV8100B	100(11)	8.5/860	—	0.7	398/1

Table 6. 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 PDC, PCS or DCS1800 base station applications.

Device	P_{out} Watts	Class	Bias Point Vdc/mA	Gain (Typ)/Freq dB/MHz	θ_{JC} °C/W	Package/Style
V_{CC} = 26 Volts–Bipolar Die						
MRF6404(16)	30	AB	26/150	8.2/1880	1.4	395C/1
MRF6420(46a)	60	AB	26/200	10/1880	0.7	451/1
MRF15060	60	AB	26/200	11/1490	0.7	451/1
MRF15060S	60	AB	26/200	11/1490	0.7	451A/1
MRF15090	90	A, AB	26/250	7.5/1490	0.7	375A/1
MRF20030R	30	AB	26/120	11/2000	1.4	395C/1
MRF20060R	60	AB	26/200	9.8/2000	0.7	451/1
MRF20060RS	60	AB	26/200	9.8/2000	0.7	451A/1

(7)Typical @ 1090 MHz

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

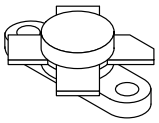
(11)Output power at 1 dB compression in Class AB

(16)Formerly known as “TP4035”

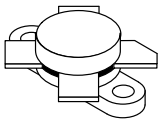
(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

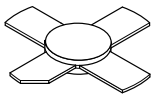
RF Power MOSFETs and Bipolar Transistors Packages



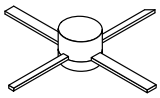
CASE 211–07
STYLE 1, 2
(.380″ FLANGE)



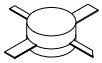
CASE 211–11
STYLE 1, 2
(.500″ FLANGE)



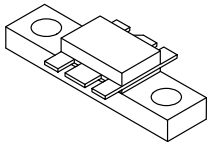
CASE 249
STYLE 1, 3
(.280″ PILL)



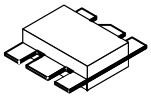
CASE 305A
STYLE 1, 2
(.204″ PILL)



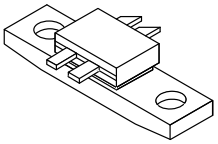
CASE 305D
STYLE 1



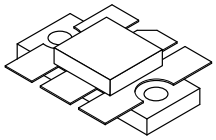
CASE 319
STYLE 1, 2, 3
(CS–12)



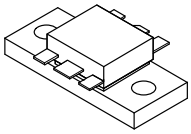
CASE 319A
STYLE 2



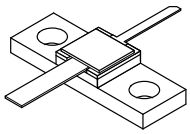
CASE 319B
STYLE 1



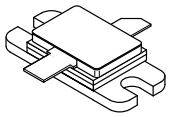
CASE 333
STYLE 1, 2



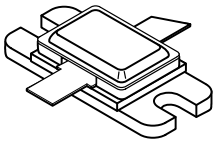
CASE 333A
STYLE 1, 2
(MAAC PAC)



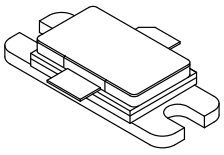
CASE 336E
STYLE 1



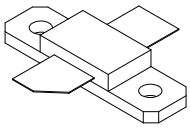
CASE 355C
STYLE 1



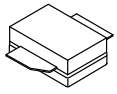
CASE 355E
STYLE 1



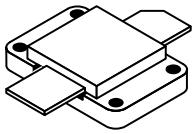
CASE 355J–02
STYLE 1



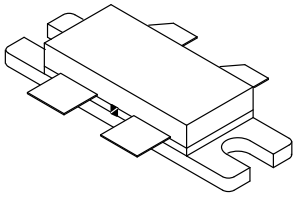
CASE 360B
STYLE 1
(Micro 250)



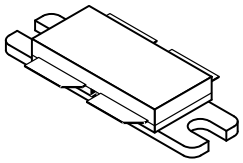
CASE 360C
STYLE 1
(Micro 250S)



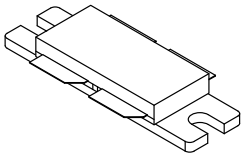
CASE 368
STYLE 2
(HOG PAC)



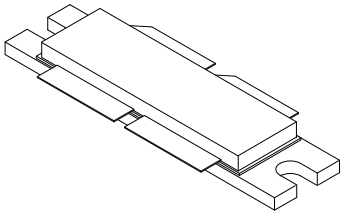
CASE 375
STYLE 2



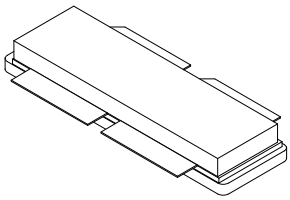
CASE 375A
STYLE 1



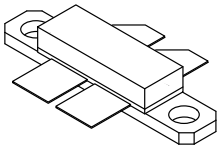
CASE 375B
STYLE 2
(Micro 860)



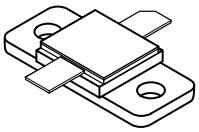
CASE 375D
STYLE 2



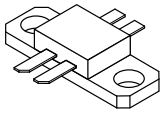
CASE 375E
STYLE 2



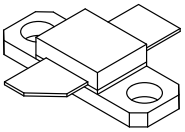
CASE 375F
STYLE 1



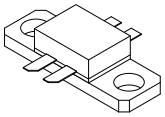
CASE 376B
STYLE 1



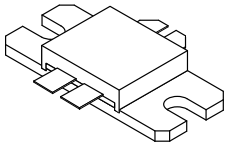
CASE 395B
STYLE 1



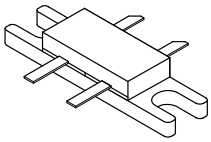
CASE 395C
STYLE 1, 2



CASE 395E
STYLE 1

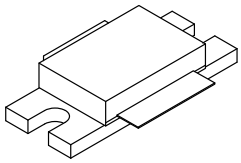


CASE 398
STYLE 1

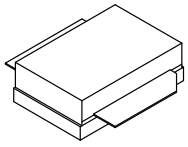


CASE 412
STYLE 1

CASE 449
STYLE 1
PLASTIC
(PLD 1)



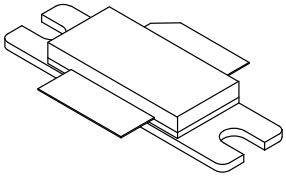
CASE 451
STYLE 1



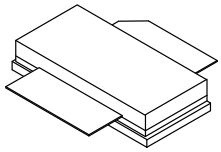
CASE 451A
STYLE 1

CASE 458
STYLE 1
(Micro 200S)

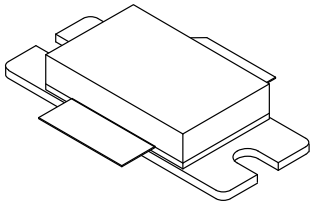
CASE 458A
STYLE 1
(Micro 200Z)



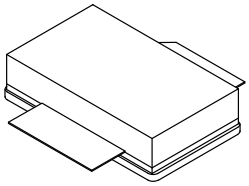
CASE 465
STYLE 1



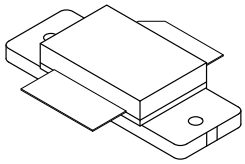
CASE 465A
STYLE 1



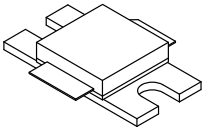
CASE 465B
STYLE 1



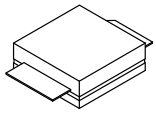
CASE 465C
STYLE 1



CASE 465D
STYLE 1

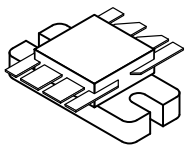


CASE 465E
STYLE 1



CASE 465F
STYLE 1

CASE 466
STYLE 1
PLASTIC
(PLD 1.5)



CASE 744A
STYLE 1, 2

Motorola RF Amplifier Modules

Motorola's RF portfolio includes many hybrid designs optimized to perform either in narrowband base station transmitter applications, or in broadband linear amplifiers. Motorola modules feature two or more active transistors (LDMOS or Bipolar die technology) and their associated 50 ohm matching networks. Circuit substrate and metallization have been selected for optimum performance and reliability. For PA designers, hybrid modules offer the benefits of small and less complex system designs, in less time and at a lower overall cost.

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Motorola RF Amplifier Modules

Complete amplifiers with 50 ohm input and output impedances are available for all popular base station transmitter systems, including GSM and CDMA, covering frequencies from 800 MHz up to 2.2 GHz.

Base Stations

Designed for applications such as macrocell drivers and microcell output stage, these class AB amplifiers are ideal for GSM base station systems at 900, 1800 and 1900 MHz, with power requirements up to 16 watts.

Table 1. Base Stations

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	f Frequency MHz	G_P Power Gain, Min dB	V_{DD} Supply Voltage Volts	Package/Style
1805–1880 MHz (for GSM1800) — Class AB (LDMOS Die) – Lateral MOSFETs						
MHW1810–1★	10	0.040	1805–1880	24	26	301AW/1
MHW1810–2★	10	0.008	1805–1880	32	26	301AW/1

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
1805–1880 MHz (for GSM1800) — Class AB (Silicon Bipolar Die)						
MHW1815	15	0.015	1805–1880	30	26	301AK/1

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	f Frequency MHz	G_P Power Gain, Min dB	V_{DD} Supply Voltage Volts	Package/Style
1930–1990 MHz (for GSM1900) — Class AB (LDMOS Die) – Lateral MOSFETs						
MHW1910–1(46a)	10	0.040	1930–1990	24	26	301AW/1

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
1930–1990 MHz (for PCS1900) — Class AB (Silicon Bipolar Die)						
MHW1915	15	0.019	1930–1990	29	26	301AK/1
MHW1916	15	0.013	1930–1990	31	26	301AK/1

Table 2. Base Station Drivers

These 50 ohm amplifiers are recommended for modern multi–tone CDMA, TDMA and UMTS base station pre–driver applications. Their high third–order intercept point, tight phase and gain control, and excellent group delay characteristics make these devices ideal for use in high–power feedforward loops.

Ultra–Linear (for CDMA, WCDMA, TDMA, Analog) – Class A (Silicon Bipolar Die)

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	NF (Typ) dB	Case/ Style
MHL9125	800–960	15	400	20	0.5	31	43	7.5	448/2
MHL9128	800–960	28	400	20	0.5	31	43	7.5	448/1

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

Table 2. Base Station Drivers (continued)

Ultra–Linear (for CDMA, WCDMA, TDMA, Analog) – Class A (LDMOS Die) – Lateral MOSFETs

Device	BW MHz	V_{DD} (Nom.) Volts	I_{DD} (Nom.) mA	Gain (Nom.) dB	Gain Flatness (Typ) ±dB	P_{1dB} (Typ) dBm	3rd Order Intercept (Typ) dBm	NF (Typ) dB	Case/ Style
MHL9838 (46a)	800–925	28	770	31	.1	39	50	3.7	301AP/1
MHL9236★	800–960	26	550	30.5	.1	34	47	3.5	301AP/1
MHL9236M★	800–960	26	550	30.5	.1	34	47	3.5	301AP/2
MHL9318 (46a)	860–900	28	500	17.5	.1	35.5	49	3.0	301AS/1
MHL19338 (46a)	1900–2000	28	500	30	.1	36	46	4.2	301AP/1
MHL21336 (46b)	2100–2200	26	500	30	.15	35	45	4.5	301AP/1

Wideband Linear Amplifiers

Table 1. Standard 50 Ohm Linear Hybrids

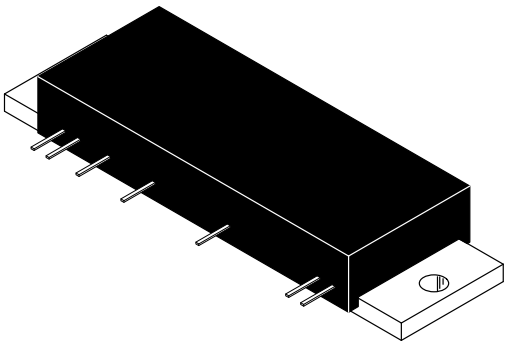
This series of RF linear hybrid amplifiers have been optimized for wideband, 50 ohm applications. These amplifiers were designed for multi–purpose RF applications where linearity, dynamic range and wide bandwidth are of primary concern. Each amplifier is available in various package options. The MHL 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
CA2810C	10–450	24	310	34/50	1.5	30	43/300	5/300	714F/1
MHL8118	40–1000	28	400	17.5/900	1	30	41.5/1000	8.5/1000	448/1
MHL8115	40–1000	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	38/1000	7.5/1000	448/1
MHL8015	40–1000	15	380	18.5/900	1	26	38/1000	7.5/1000	448/2

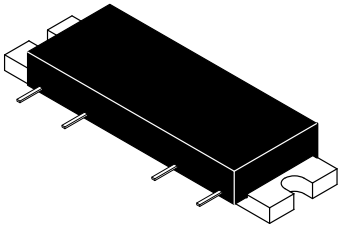
(46) To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

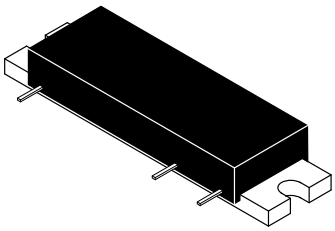
RF Amplifier Modules Packages



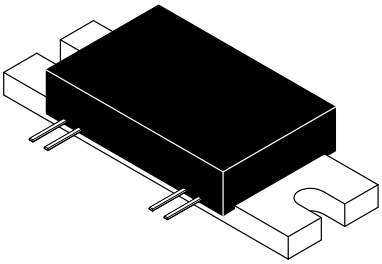
CASE 301AK
STYLE 1



CASE 301AP
STYLE 1, 2



CASE 301AS
STYLE 1



CASE 301AW
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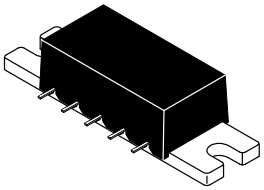
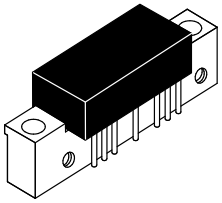


CASE 448
STYLE 1, 2



CASE 714F
STYLE 1

Motorola RF CATV Distribution Amplifiers

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 of Contents

Motorola RF CATV Distribution Amplifiers

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.

Forward Amplifiers

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 @ 1000 MHz dB Max	Package/ Style
MHW9142	14	152	+38	–59(40)	–59	–63	8.5	714Y/1
MHW9182B★	18.5	152	+38	–63(40)	–61	–61	7.5	714Y/1
MHW9242A(46a)	24.3	152	+38	–61(40)	–62	–60	8.0	714Y/1

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
CA901	17	40 – 860	24	–60	120	8.0	714P/2
CA901A	17	40 – 860	24	–64	120	8.0	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

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 128 CH	Cross Modulation FM = 55.25 MHz dB 128 CH	Noise Figure @ 860 MHz dB Max	Package/ Style
MHW8142	14	128	+38	–60(40)	– 61	– 66	8.0	714Y/1
MHW8182B★	18.5	128	+38	–64(40)	– 66	– 65	7.5	714Y/1
MHW8222	22	128	+38	–60(40)	– 60	– 60	7.5	714Y/1
MHW8222B(46a)	22	128	+38	–59(40)	– 64	– 63	7.0	714Y/1
MHW8242A	24	128	+38	–62(40)	– 64	– 62	7.5	714Y/1
MHW8272A	27.2	128	+38	–64(40)	– 64	– 62	7.0	714Y/1
MHW8292	29	128	+38	–56(40)	– 60	– 60	7.0	714Y/1

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

(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99

★New Product

CATV Distribution: Forward Amplifiers (continued)

40 – 860 MHz Hybrids, V_{CC} = 24 Vdc, Class A (continued)

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications: Output Level dBmV	2nd Order Test dB	Composite Triple Beat dB 128 CH	Cross Modulation FM = 55.25 MHz dB 128 CH	Noise Figure @ 860 MHz dB Max	Package/ Style
Power Doubling Hybrids								
MHW8185L(21)★	18.5	128	+40	–62(39)	– 63	– 64	8.5*	714Y/1
MHW8185LR(28)★	18.5	128	+40	–62(39)	– 63	– 64	8.5*	714Y/2
MHW8185	18.8	128	+40	–62(39)	– 64	– 64	8.0	714Y/1
MHW8185R(14)	18.8	128	+40	–62(39)	– 64	– 64	8.0	714Y/2
MHW8205L(22)★	19.5	128	+40	–62(39)	– 63	– 64	8.5*	714Y/1
MHW8205	19.8	128	+40	–60(39)	– 63	– 64	8.0	714Y/1
MHW8205R(24)★	19.8	128	+40	–60(39)	– 63	– 64	8.0	714Y/2
MHW8205LR(29,46a)	19.8	128	+40	–62(39)	– 63	– 64	8.0	714Y/2

*@ 870 MHz

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	Cross Modulation FM = 55.25 MHz dB 110 CH	Noise Figure @ 750 MHz dB Max	Package/ Style
MHW7142	14	110	+40	–60(39)	– 62	– 66	8.0	714Y/1
MHW7182B★	18.5	110	+40	–63(39)	– 66	– 64	6.5	714Y/1
MHW7222	22	110	+40	–55(39)	– 60	– 60	7.0	714Y/1
MHW7222A	22	110	+40	–57(39)	– 60	– 60	7.0	714Y/1
MHW7242A	24	110	+40	–62(39)	– 63	– 61	7.0	714Y/1
MHW7272A	27.2	110	+40	–64(39)	– 64	– 60	6.5	714Y/1
MHW7292	29	110	+40	–60(39)	– 60	– 60	6.5	714Y/1
Power Doubling Hybrids								
MHW7185CL(23)★	18.5	110	+44	–64(36)	–61	–63	7.5	714Y/1
MHW7185CLR(33,46a)	18.5	110	+44	–64(36)	–61	–63	7.5	714Y/2
MHW7185C	18.8	110	+44	–64(36)	–62	–63	7.5	714Y/1
MHW7185CR(15)	18.8	110	+44	–64(36)	–62	–63	7.5	714Y/2
MHW7205CL(27)★	19.5	110	+44	–63(36)	–61	–62	7.5	714Y/1
MHW7205C	19.8	110	+44	–63(36)	–61	–62	7.5	714Y/1
MHW7205CLR(34,46a)	19.8	110	+44	–63(36)	–61	–62	7.5	714Y/2
MHW7205CR(26)★	19.8	110	+44	–63(36)	–61	–62	7.5	714Y/2

(14)Forward Mirror Amplifier Version of MHW8185
(15)Forward Mirror Amplifier Version of MHW7185C
(21)Low DC Current Version of MHW8185
(22)Low DC Current Version of MHW8205
(23)Low I_{CC} Version of MHW7185C
(24)Forward Mirror Amplifier Version of MHW8205
(26)Forward Mirror Amplifier Version of MHW7205C
(27)Low I_{CC} Version of MHW7205C
(28)Forward Mirror Amplifier Version of MHW8185L
(29)Forward Mirror Amplifier Version of MHW8205L
(33)Forward Mirror Amplifier Version of MHW7185CL
(34)Forward Mirror Amplifier Version of MHW7205CL
(36)Composite 2nd order; V_{out} = + 44 dBmV/ch
(39)Composite 2nd order; V_{out} = +40 dBmV/ch
(46)To be introduced: a) 1Q99; b) 2Q99; c) 3Q99
★New Product

CATV Distribution: Forward Amplifiers (continued)

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

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications				Noise Figure @ 550 MHz dB	Package/ Style
			Output Level	2nd Order Test	Composite Triple Beat dB	Cross Modulation dB		
			dBmV	dB	77 CH	77 CH	Max	
MHW6182	18	77	+44	–72(35)	–58	–62	7.0	714Y/1
MHW6222	22	77	+44	–66(35)	–57	–57	6.0	714Y/1
MHW6272	27	77	+44	–64(35)	–57	–57	6.5	714Y/1
MHW6342	34	77	+44	–64(35)	–57	–57	6.5	714Y/1
MHW6342T	34	77	+44	–64(35)	–57	–57	6.5	714AA/1
Power Doubling Hybrids								
MHW6185B	18	77	+44	–65(36)	–65	–68	7.5	714Y/1

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

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications				Noise Figure @ 450 MHz dB	Package/ Style
			Output Level	2nd Order Test	Composite Triple Beat dB	Cross Modulation dB		
			dBmV	dB	60 CH	60 CH	Max	
MHW5182A	18	60	+46	–72(31)	–61	–59	6.5	714Y/1
MHW5222A	22	60	+46	–72(31)	–60	–59	5.5	714Y/1
MHW5342T	34	60	+46	–68(31)	–59	–59	6.0	714AA/1
MHW5382A	38	60	+46	–64(31)	–59	–59	5.0	714Y/1
Power Doubling Hybrids								
MHW5185B	18	60	+46	–67(32)	–67	–67	7.0	714Y/1

(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

Reverse Amplifiers

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

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	Maximum Distortion Specifications						Noise Figure @ 175 MHz dB Max	Package/ Style
			Output Level dBmV	2nd Order Test(30) dB	Composite Triple Beat dB		Cross Modulation dB			
					22 CH	26 CH	22 CH	26 CH		
MHW1134	13	22	+50	–72	–73	–71(19)	–65	–65(19)	7.0	714Y/1
MHW1184	18	22	+50	–72	–70	–70(19)	–64	–64(19)	5.5	714Y/1
MHW1224	22	22	+50	–72	–69	–68.5(19)	–62	–62(19)	5.5	714Y/1
MHW1244	24	22	+50	–72	–68	–67.5(19)	–61	–61(19)	5.0	714Y/1

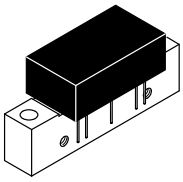
Low Current Amplifiers — 5–50 MHz Hybrids, V_{CC} = 24 Vdc, Class A

Device	Hybrid Gain (Nom.) dB	Channel Loading Capacity	I_{DC} mA Max	Maximum Distortion Specifications				Noise Figure @ 50 MHz dB Max	Package/ Style
				Output Level dBmV	2nd Order Test(30) dB	Composite Triple Beat dB	Cross Modulation dB		
						4 CH	4 CH		
MHW1254L	25	4	135	+50	–70	–70	–62	4.5	714Y/1
MHW1304L	30	4	135	+50	–70	–66	–57	4.5	714Y/1

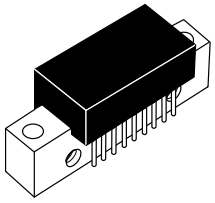
(19)Typical

(30)Channels 2 and A @ 7

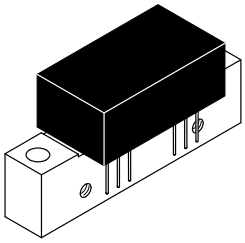
RF CATV Distribution Amplifiers



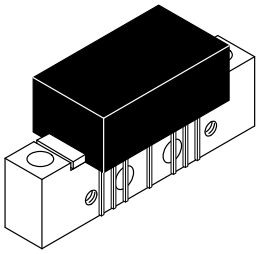
CASE 714AA
STYLE 1



CASE 714P
STYLE 2



CASE 714V



CASE 714Y
STYLE 1, 2

SUNSTAR商斯达实业集团是集研发、生产、工程、销售、代理经销 、技术咨询、信息服务等为一体的高科技企业，是专业高科技电子产品生产厂家，是具有 10 多年历史的专业电子元器件供应商，是中国最早和最大的仓储式连锁规模经营大型综合电子零部件代理分销商之一,是一家专业代理和分銷世界各大品牌IC芯片和電子元器件的连锁经营綜合性国际公司。在香港、北京、深圳、上海、西安、成都等全国主要电子市场设有直属分公司和产品展示展销窗口门市部专卖店及代理分销商，已在全国范围内建成强大统一的供货和代理分销网络。 我们专业代理经销、开发生产电子元器件、集成电路、传感器、微波光电元器件、工控机/DOC/DOM电子盘、专用电路、单片机开发、MCU/DSP/ARM/FPGA软件硬件、二极管、三极管、模块等，是您可靠的一站式现货配套供应商、方案提供商、部件功能模块开发配套商。**专业以现代信息产业（计算机、通讯及传感器）三大支柱之一的传感器为主营业务，专业经营各类传感器的代理、销售生产、网络信息、科技图书资料及配套产品设计、工程开发。我们的专业网站——中国传感器科技信息网（全球传感器数据库） www.SENSOR-IC.COM 服务于全球高科技生产商及贸易商，为企业科技产品开发提供技术交流平台。欢迎各厂商互通有无、交换信息、交换链接、发布寻求代理信息。欢迎国外高科技传感器、变送器、执行器、自动控制产品厂商介绍产品到 中国，共同开拓市场。**本网站是关于各种传感器-变送器-仪器仪表及工业自动化大型专业网站,深入到工业控制、系统工程计 测计量、自动化、安防报警、消费电子等众多领域，把最新的传感器-变送器-仪器仪表买卖信息,最新技术供求,最新采购商,行业动态，发展方向，最新的技术应用和市场资讯及时的传递给广大科技开发、科学研究、产品设计人员。本网站已成功为石油、化工、电力、医药、生物、航空、航天、国防、能源、冶金、电子、工业、农业、交通、汽车、矿山、煤炭、纺织、信息、通信、IT、安防、环保、印刷、科研、气象、仪器仪表等领域从事科学研究、产品设计、开发、生产制造的科技人员、管理人员 、和采购人员提供满意服务。 **我公司专业开发生产、代理、经销、**销售各种传感器、变送器、敏感元器件、开关、执行器、仪器仪表、自动化控制系统： 专门从事设计、生产、销售各种传感器、变送器、各种测控仪表、热工仪表、现场控制器、计算机控制系统、数据采集系统、各类环境监控系统、专用控制系统应用软件以及嵌入式系统开发及应用等工作。如热敏电阻、压敏电阻、温度传感器、温度变送器、湿度传感器、 湿度变送器、气体传感器、 气体变送器、压力传感器、 压力变送、称重传感器、物（液）位传感器、物（液）位变送器、流量传感器、 流量变送器、电流（压）传感器、溶氧传感器、霍尔传感器 、图像传感器、超声波传感器、位移传感器、速度传感器、加速度传感器、扭距传感器、红外传感器、紫外传感器、 火焰传感器、激光传感器、振动传感器、轴角传感器、光电传感器、接近传感器、干簧管传感器、继电器传感器、微型电泵、磁敏（阻）传感器 、压力开关、接近开关、光电开关、色标传感器、光纤传感器、齿轮测速传感器、 时间继电器、计数器、计米器、温控仪、固态继电器、调压模块、电磁铁、电压表、电流表等特殊传感器 。 同时承接传感器应用电路、产品设计和自动化工程项目。

欢迎索取免费详细资料、设计指南和光盘 ；产品凡多，未能尽录，欢迎来电查询。

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