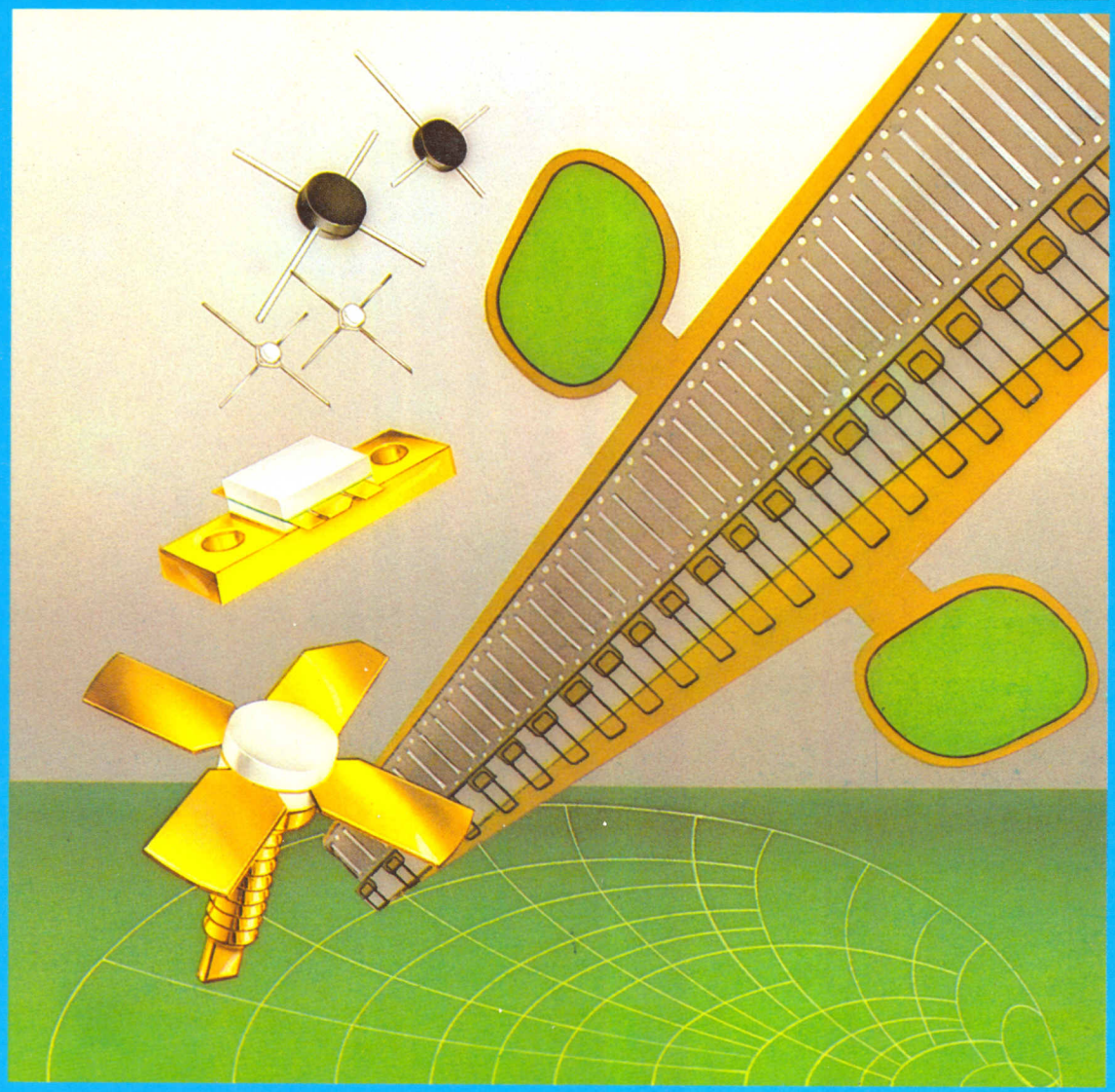
RF & Microwave Products Data

Selector Guide & Cross Reference



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Selector Guide & Cross Reference

Motorola's broad line of RF Semiconductors includes RF Power and Small-Signal Transistors, Hybrid Amplifiers and Tuning Diodes. These components are designed for Land Mobile, Military, Avionic, and Marine Radios; CATV Distribution Networks; Radar and Electronic Warfare Systems; Microwave Communication Links; and Electronic Instrumentation.

The 500 PLUS devices in this selector guide/cross reference include 40 newly introduced parts including:

- New dual-gate GaAs FETs for low-cost operation at 1 GHz or less
- State-of-the-art, 800 MHz discretes and hybrids for cellular, base station and mobile radio designs
- Unique RF TMOS power FETs with high-gain, improved-high-order IMD characteristics
- Superior Fine-Line, Bipolar, Small-Signal Transistors for enhanced gain and NF performance

The combination of this broad line of components and new technologies proves Motorola is the RF semiconductor manufacturer with the complete solution.

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2N5589	2N5589		2N6084	2N6084		2SC822	MRF607	
2N5590	2N5590		2N6093	MRF464		2SC823		2N5943
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2N5635	2N5635		2N6095	2N6095		2SC831		2N3927
2N5636	2N5636		2N6096	2N6096		2SC852		2N5943
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AT25B		MRF901	BFP96	MRF573		BLU98	MRF581	
AT0045	MRF904		BFQ22	MRF904		BLU99	MRF841	
AT50	BFR90		BFQ42	MRF607		BLV10		MRF212
AT51	BFR90		BFQ43	MRF237		BLV11	2N6367	
AT52	BFR90		BFQ63	MRF914		BLV15/12		MRF221
AT1425		BFR90	BFR36	MRF517		BLV20		2N5641
AT1825	2N6604		BFR38	2N4959		BLV21	2N6370	
AT1845	2N6603		BFR49	2N6603		BLV45/12	MRF216	
AT1845A	2N6603		BFR53		MMBR920	BLV75/12	MRF247	
AT2625		2N6603	BFR63	MRF511		BLV80/28	MRF316	
AT2645		2N6603	BFR64	MRF511		BLV90	MRF838A	
AT2645A		2N6603	BFR65	MRF511		BLV91	MRF870A	
AT2715	MRF962		BFR90	BFR90		BLV92		MRF870
B1-12		2N4427	BFR90A	BFR90		BLV93	MRF840	
B2-8Z		2N6080	BFR91	BFR91		BLV94	MRF842	
B3-12	2N6080		BFR92	MMBR920		BLV95	MRF844	
B3-28		2N5641	BFR93	MMBR930		BLV96	MRF846	
B5-8Z		2N6081	BFR94	MRF511		BLV97	MRF894	
B8-12	MRF212		BFR95		MRF517	BLW29	2N6081	
B12-12	2N6081		BFR96	BFR96		BLW31		MRF223
B12-28		MRF314	BFR99	2N4959		BLW50F	MRF464	
B15-12	2N6081		BFS22A	2N3924		BLW60	MRF240	
B25-12	2N6082		BFT24	MRF931		BLW60C	MRF450A	
B25-28	MRF314		BFT50	MRF904		BLW64	MRF208	
B30-12	2N6083		BFT95		MRF536	BLW75	MRF226	
B40-12	2N6084		BFT96		MRF536	BLW76	MRF464	
B40-12A	2N6084		BFW16A	MRF517		BLW77	MRF435	
B40-28	MRF315		BFW17A	MRF517		BLW78	MRF464	
B45-12		2N6084	BFW46	2N3924		BLW79	2N5944	
B70-28	2N6160		BFW47	2N3553		BLW80	2N5945	
BA102		MV1636	BFW92	BFW92A		BLW81	2N5946	
BA111		MV1644	BFW93		BFW92A	BLW82	MRF644	
BA121		1N5443A	BFW94	MRF559		BLW83	MRF466	
BA125		1N5449A	BFX89	BFX89		BLW84	MRF314	
BA138		1N5441A	BFY90	BFY90		BLW85	MRF224	
BA149		1N5139	BGY22		MHW401	BLW85SP	MRF224	
BA150		1N5453A	BGY22A		MHW401	BLW86	MRF315A	
BAL0105-50		MRF390	BGY23		MHW709	BLW87	MRF222	
BAL0105-100		MRF392	BGY23A		MHW709	BLW89	MRF5174	
BAL0405-75		MRF392	BGY40A	MHW709-1		BLW90	MRF5174	
BAM20	MRF314		BGY40B	MHW709-2		BLW91	MRF321	
BAM40	MRF315		BGY40C	MHW709-3		BLW95	MRF429	
BAM40SR	MRF315		BGY41A	MHW710-1		BLW96	MRF448	
BAM80		MRF316	BGY41B	MHW710-2		BLW97		MRF435
BAM80SR	MRF316		BGY41C	MHW710-3		BLW99	MRF421	
BAM100SR	MRF317		BGY46A		MHW401-1	BLX13	MRF426A	
BAM120		MRF317	BGY47A		MHW401-1	BLX13C	MRF426A	
BAM120SR	MRF317		BGY47B		MHW401-2	BLX14	MRF464A	
BB104B		MV104	BGY47C		MHW401-3	BLX15	MRF428A	
BB104G		MV104G	BGY50		MHW1121	BLX39	MRF315A	
BB113		MVAM115	BGY51		MHW1122	BLX65	MRF630	
BF7-35	MRF134		BGY52		MHW1171	BLX66	2N5944	
BF14-35	MRF136		BGY53		MHW1172	BLX67	2N5946	
BF25-35	MRF171		BGY54		MHW1171	BLX68	2N5946	

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BLX69A		MRF641	C50-28		2N6439	CD1802	MRF226	
BLX91		MRF313A	CA100		MHW1171	CD1803	MRF209	
BLX91A		MRF313A	CA200		MHW1172	CD1979		MRF321
BLX92	MRF5174		CA401B		MHW1182	CD2035		MRF5175
BLX92A	MRF5174		CA416		MHW1182	CD2087		MRF5175
BLX93	MRF321		CA418	MHW1182		CD2088	MRF321	
BLX93A	MRF331		CA601B/U		MHW1342	CD2089	MRF323	
BLX94A	MRF5177A		CA636	MHW1342		CD2505		MRF321
BLX94C	MRF323		CA801	MHW590		CD2514		2N6081
BLX95	MRF5177A		CA804	MHW590		CD2545		MRF450
BLX96		MRF321	CA860	MHW590		CD2810		MRF321
BLX97		MRF321	CA870	MHW590		CD2811		MRF321
BLX98		MRF323	CA2100	MHW1171		CD2812		MRF321
BLY53A		2N5946	CA2100R	MHW1171R		CD2813		MRF321
BLY57	2N3926		CA2101	MHW3171		CD3025		2N5946
BLY58	2N3927		CA2200	MHW1172		CD3400		MRF315
BLY59	2N3375		CA2200R	MHW1172R		CD3401		MRF316
BLY60	2N3632		CA2201	MHW3172		CD3403		MRF317
BLY87A	MRF212		CA2300	MHW3222		CD3463	MRF421	
BLY87C	MRF212		CA2301	MHW3222		CD3550		MRF315
BLY88A	2N6081		CA2418	MHW1184		CD4024	MRF223	
BLY88C	2N6081		CA2422	MHW1224		CD5916	MRF5177	
BLY89A	2N6082		CA2600	MHW3342		CD5918	MRF321	
BLY89C	2N6082		CA2601BU		MHW1343	CD5919A	MRF323	
BLY90	MRF250A		CA2603	MHW1344		CD5944	2N5944	
BLY91A	2N5641		CA2700	MHW1392		CD5945	2N5945	
BLY91C	2N5641		CA2800		MHW1172	CD5946	2N5946	
BLY92A	2N5641		CA2800H		MHW590	CD6105		MRF5177A
BLY92C	2N5642		CA2810	MHW1342		CD6105A		MRF5177A
BLY93A	MRF314A		CA2810H		MHW590	CD7012	MRF454	
BLY93C	MRF314A		CA2812	MHW593		CF4-28	MRF134	
BLY94	MRF315A		CA2812H		MHW593	CHE	MRF626	
BM15-12	MRF215		CA2813		MHW591	CM10-12A	MRF641	
BM30-12	MRF216		CA2818	MHW1182		CM10-28	MRF321	
BM45-12	MRF243		CA2818H		MHW592	CM20-12A	MRF644	
BM70-12	MRF245		CA2820	MHW590		CM25-28	MRF325	
BM80-12	MRF245		CA2820H		MHW590	CM25-28A	MRF5177A	
BM80-28	MRF316		CA2830	MHW592		CM30-12A	MRF646	
BM100-28	MRF317		CA2830H		MHW592	CM45-12A	MRF646	
BP8-12	MRF261		CA2832H		MHW592	CM45-28	MRF326	
BP15-12	MRF262		CA2840	MHW1222		CM50-12A	MRF648	
BP30-12	MRF264		CA2840H		MHW592	CM60-12A	MRF648	
BP30-12L	MRF264		CA2842H		MHW592	CM80-28	MRF327	
C2M50-28		MRF526	CA2850	MHW1182		CM80-28R	MRF327	
C2M50-28R		MRF326	CA2870	MHW1342		CME15-12	MRF641	
C2M60-28	2N6439		CA2870H		MHW590	CME30-12	MRF646	
C2M60-28R	2N6439		CA2875	MHW1182		CME50-12	MRF648	
C2M70-28R	MRF327		CA2876	MHW1221		CP5-12	MRF660	
C2M100-28	MRF329		CA3100	MHW3171		CP10-12	MRF660	
C2M100-28A	MRF329		CA3101	MHW3171		CTC14		MRF464A
C1/2-12	MRF626		CA3200	MHW3172		CTC15	MRF428A	
C1-12	MRF616		CA3202	MHW3172		CTC1175M	MRF1150M	
C1-12Z	2N5944		CA4101	MHW5171		CTC1350M	MRF1325M	
C1-28		MRF313	CA4201	MHW5172		CTC2001	MRF2001	
C2-8Z		2N5945	CA4411	MHW1134		CTC2002		MRF2003
C3-12	2N5645		CA4412	MHW1134		CTC2003	MRF2003	
C3-28	MRF5175		CA4418	MHW1134		CTC2005	MRF2008	
C5-8Z		2N5946	CA4422	MHW1224		CTC2010	MRF2010	
C5-12	MRF652		CA4600	MHW5342		CZ8110	MWA110	
C10-12A	2N5946		CA5101	MHW5181		CZ8120	MWA120	
C12-12	2N5646		CA5202	MHW5182		CZ8130	MWA130	
C12-28	MRF321		CA5300	MHW5222		CZ8210	MWA210	
C25-12	2N6136		CA5301	MHW5222		CZ8220	MWA220	
C25-28	MRF323		CA5600	MHW5342		CZ8230	MWA230	
C40-28		MRF326	CD1752		MRF317	CZ8310	MWA310	

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CZ8320	MWA320		GM-104-100		MRF329	LT1001A	MRF586	
CZ8330	MWA330		GPA501		MWA210	LT2001	MRF587	
CZ8401		MWA110	GPA502		MWA220	LT3005		MRF587
CZ8402		MWA120	GPA503		MWA230	LT3046	MRF965	
CZ8403		MWA230	GPA510		MWA210	LT3072	MRF904	
CZ8404		MWA230	GPA511		MWA220	LT3203	MRF580	
CZ8461		MWA110	GPA512		MWA230	LT3204	MRF581	
CZ8462		MWA120	GPA1001		MWA310	LT3700	2N6604	
CZ8463		MWA230	GPA1002		MWA320	LT3703	BFR91	
CZ8464		MWA230	GPA1003		MWA330	LT3704	MRF911	
D1/2-12		MRF816	GPA1004		MWA320	LT3746	MRF965	
D1-12B		MRF817	GPA1005		MWA320	LT3772	MRF914	
D1-12E	MRF838A		GPA1006		MWA330	LT3785	MRF913	
D1-28		MRF313	GPD110	MWA110		LT4400	MRF962	
D2-12B		MRF817	GPD120	MWA120		LT4403	BFR96	
D2-12E		MRF870A	GPD130	MWA130		LT4404	MRF961	
D3-28		MRF5174	GPD310	MWA310		LT4446	MRF965	
D10-28		MRF321	GPD320	MWA320		LT4485	MRF912	
D10P		MRF1015MA	GPD330	MWA330		LT4700	MRF572	
D20-28		MRF323	GPD401		MWA110	LT4703	BFR91	
DHE		MRF838A	GPD402		MWA120	LT4704	MRF571	
DM10P		MRF1015MB	GPD403		MWA230	LT4746	MRF905	
DM30-12BA	MRF844		GPD404		MWA230	LT4772	MRF914	
DM30P		MRF1035MB	GPD461		MWA110	LT4785	MRF573	
DM50P		MRF1090MB	GPD462		MWA120	M57704H		MHW710-2
DMB5-12		MRF840	GPD463		MWA230	M57704L		MHW710-1
DMB5-12BA		MRF840	GPD464		MWA230	M57704M		MHW710-1
DMB10-12	MRF840		HMIL-100-28	MRF422		MBD101	MBD101	
DMB10-12BA	MRF840		HMIL-150-50	MRF429		MBD201	MBD201	
DMB10-25	MRF892		HXTR2102	2N6604		MBD301	MBD301	
DMB15-12	MRF842		HXTR6104	2N6603		MBD501	MBD501	
DMB20-12	MRF842		HXTR6105		2N6603	MBD701	MBD701	
DMB20-12BA	MRF842		J01006	MRF315		MHW401	MHW401	
DMB30-12	MRF844		J02000	MRF5177A		MHW580	MHW1342	
DMB30-25	MRF894		J02005	MRF5177A		MHW594	MHW1171	
DMB45-12	MRF846		J02007A	2N6439		MHW595	MHW1172	
DMB45-12BA	MRF846		J02009	MRF325		MM439		2N4959
DME2	MRF1002MA		J02014	MRF326		MM1500		MRF905
DME6L		MRF1008MB	J02015A	MRF327		MM1500A		MRF905
DME7	MRF1008MC		J02016		MRF327	MM1501		MRF905
DME10	MRF1015MC		J02058		MRF327	MM1501A		MRF905
DME25	MRF1035MC		J02401		MRF326	MM1510	2N5851	
DME30L	MRF1035MC		J03020	MRF644		MM1511	2N5852	
DME50	MRF1090MC		J03025	MRF644		MM1549	2N5635	
DME75	MRF1090MC		J03030	MRF646		MM1550	2N5636	
DME120L		MRF1150	J03037	MRF646		MM1551	2N5637	
DME150	MRF1150MC		J03040	MRF646		MM1557	2N5641	
DME250		MRF1250M	J03050	MRF648		MM1558	2N5642	
DME300	MRF1325M		J03055	MRF648		MM1559	2N5643	
DME375		MRF1325M	J03401	MRF840		MM1561	2N6166	
DME600		MRF1550	J03402	MRF842		MM1601	2N5589	
DV1006	MRF137		J03403	MRF844		MM1602	2N5590	
DV1007	MRF171		J03404	MRF846		MM1603	2N5591	
DV1008	MRF172		J04020	MRF215		MM1605	2N5841	
DV1010	MRF174		J04030	MRF216		MM1606	2N5842	
DV2805S	MRF134		J04036	MRF216		MM1607	2N5842	
DV2810S	MRF136		J04040	MRF216		MM1608	2N5846	
DV2820S	MRF136		J04045	MRF216		MM1612	2N6255	
DV2840S	MRF171		J04070	MRF247		MM1618	2N5847	
DV2880U	MRF172		J04075	MRF247		MM1620	2N5849	
DV28120U	MRF174		J04080	MRF245		MM1622	2N5849	
ESM269	MRF914		LMIL-1	MRF890		MM1632	2N5941	
GM-104-1A		MRF313	LMIL-3		MRF890	MM1633	2N5942	
GM-104-4		MRF5174	LMIL-10		MRF892	MM1646	2N5849	
GM-104-20		MRF323	LNA1001		MWA310	MM1660	2N5644	

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MM1661	2N5645	
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MM1665	2N6136	
MM1666	2N6082	
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MM1668	2N6084	
MM1669	2N6084	
MM1680	2N6080	
MM1681	2N6081	
MM1713	2N4072	
MM1943	2N4072	
MM1945	2N4072	
MM4020	2N6094	
MM4021	2N6095	
MM4022	2N6096	
MM4023	2N6097	
MM4500	2N5583	
MM5177	MRF5177	
MM8002	2N5943	
MM8003	MRF511	
MM8004	MRF8004	
MM8006	2N5031	
MM8007	2N5032	
MM8008		MRF905
MM8010		MRF905
MM8011		MRF905
MM8012	2N5947	
MM8020	2N5836	
MM8021	2N5837	
MM8023		2N5943
MPN3404	MPN3404	
MRA1720-2		MRF2003M
MRA1720-5		MRF2005M
MRA1720-9		MRF2010M
MRA1720-20		MRF2016M
MRAL1720-2	MRF2003M	
MRAL1720-5	MRF2005M	
MRAL1720-9	MRF2010M	
MRAL1720-20		MRF2016M
MRAL2023-1.5	MRF2001M	
MRAL2023-1.5H		MRF2001M
MRAL2023-3	MRF2003M	
MRAL2023-3H		MRF2003M
MRAL2023-6	MRF2010M	
MRAL2023-6H		MRF2010M
MRAL2023-12	MRF2016M	
MRAL2023-12H		MRF2016M
MRAL2023-18H		MRF2016M
MRF201	2N6255	
MRF203		MRF245
MRF305	MRF325	
MRF306	2N6439	
MRF415	2N6366	
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MRF605	2N6439	
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MRF621	MRF646	
MRF902	2N6603	
MRF912	2N6604	
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MRF5178		2N6439
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MSC1075M	MRF1090MA/B	
MSC1090M	MRF1090MA/B	
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MSC1175M	MRF1150MA/B	
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MSC1325M	MRF1325M	
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MSC2307		MRF2010
MSC82001	MRF2001	
MSC82003	MRF2003	
MSC82005	MRF2005	
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MSC82020M	MRF2016M	
MSC82201	MRF2001	
MSC82203	MRF2003	
MSC82304M	MRF2005M	
MSC82310M	MRF2010M	
MSC82313M	MRF2016M	
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MVAM109	MVAM109	
MVAM115	MVAM115	
MVAM125	MVAM125	
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MX7.5	MHW709	
MX12	MHW710	
MX15	MHW710	
MX20	MHW720A	
NE0801		MRF838
NE0803		MRF840
NE0810		MRF840
NE02103		2N6603
NE02107	2N6603	

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NE02108		MRF903	NE59335	MRF536		PG215		MV1868
NE02112	MRF904		NE59503		MRF581	PG222		MV1872
NE02133	MMBR901		NE64310		MRF586	PG233		MV1876
NE02135	MRF903		NE64320	MRF587		PG239		MV1877
NE02137	MRF901		NE66912	2N6304		PG247		MV1878
NE020214-12	2N4427		NE71111	MRF534		PG307		1N5139
NE020320-12	2N5598		NE71112		2N5583	PG310		MV1866
NE020320-28		2N3553	NE73412	MRF914		PG315		MV1868
NE021020-12		2N5590	NE73433	MMBR930		PG322		MV1872
NE021020-28	2N5641		NE73435	MRF913		PG333		MV1876
NE022025-12	2N6081		NE73437	MRF911		PG339		MV1877
NE022025-28	2N5642		NE74014	MRF586		PG347		MV1878
NE022526-12	2N6082		NE74020	MRF587		PH0401H		MRF5174
NE024027-28	MRF314A		NE74054		MRF511	PH0403H	MRF5175	
NE028029-12	MRF247		NE74113	MRF586		PH0406H		MRF5175
NE028029-28	MRF316		NE74114	MRF586		PH0412H	MRF321	
NE050214-12	MRF629		NE77320	MRF587		PH0425H	MRF325	
NE050220-07		MRF750	NE85637	MRF571		PH0450D	2N6439	
NE050290-07		MRF750	NE87112	2N5179		PH0450H	2N6439	
NE050291-07		MRF750	NE88912	MM4049		PH0501H		MRF5175
NE050320-12	2N5945		NE88933	MMBR4957		PH0503H		MRF5175
NE050320-28	MRF5174		NE88935	MRF536		PH0506H	MRF321	
NE050490-07		MRF752	NE98108		MRF903	PH0512H	MRF321	
NE050491-07		MRF752	NE98203		MRF572	PH0525H	MRF325	
NE050690-07		MRF754	NE98208		MRF573	PH0550H	2N6439	
NE050691-07		MRF754	NE99008		MRF536	PH8193		MRF905
NE051020-28	MRF321		NEL080120-24	MRF890		PME04010U		MRF321
NE051025-12	2N5946		NEM020C29-28	MRF317		PME04030U	MRF325	
NE051525-12		MRF641	NEM050C29-28	MRF327		PRE04007U		MRF321
NE052025-28	MRF323		NEM054029-12		MRF646	PT3501	MRF230	
NE080120-12	MRF838A		NEM054029-28	MRF325		PT3503		MRF232
NE080420-12	MRF870A		NEM056029-12		MRF648	PT3537		2N5944
NE21903		MRF572	NEM056029-28	MRF309		PT3570	2N5947	
NE21908		MRF573	NEM080481E-12		MRF870	PT3571	2N5943	
NE21912		MRF904	NEM081081B-12	MRF840		PT3571A	2N5943	
NE21935	MRF573		NEM081081E-12	MRF840		PT4537		2N6080
NE21937	MRF571		NEM082081B-12	MRF842		PT4544		MRF212
NE22120	MRF587		NEM084081B-12	MRF844		PT4555		MRF234
NE22154		MRF511	NEM085081B-12	MRF846		PT4556		MRF450A
NE24615		MRF586	NEM092081B-28	MRF892		PT4570	2N5947	
NE24620	MRF587		NEM094081B-28	MRF894		PT4572A	2N5947	
NE32702		2N6603	PC112		1N5140	PT4574	MRF511	
NE32707	2N6603		PC113		1N5144	PT4578	MRF517	
NE32708		MRF903	PC114		1N5148	PT4579	2N5943	
NE32712	MRF904		PC115		1N5140	PT5695		MRF233
NE32730		MRF901	PC116		1N5144	PT5701	MRF402	
NE41137	MRF966		PC117		1N5148	PT8549		2N6081
NE41603		MRF962	PC122		1N5148	PT8551	2N3553	
NE41607	MRF962		PC124		1N5142	PT8554A	MRF492A	
NE41610	MRF965		PC125		1N5142	PT8717	MRF231	
NE41612		MRF965	PC126		1N5142	PT8740		MRF629
NE41635	MRF573		PC128		1N5146	PT8740A	MRF607	
NE41703		2N6603	PC129		1N5146	PT8769	MRF233	
NE41707	2N6603		PC130		1N5146	PT8809	2N5944	
NE41708		2N6603	PC135		1N5140	PT8810	MRF652	
NE41712	MRF904		PC136		1N5144	PT8811	2N5946	
NE41735		MRF901	PC137		1N5148	PT8825		2N6136
NE46734	BFQ19		PC139		1N5139	PT8828		MRF212
NE57510		MRF586	PC140		1N5139	PT8828A	MRF212	
NE57520	MRF587		PC141		1N5139	PT8837	2N6081	
NE57803		MRF572	PEE0015U	MRF323		PT8838	2N6084	
NE57807	MRF572		PEE0020U	MRF323		PT8850		2N5847
NE57808		MRF573	PEE0035U	MRF5177A		PT8850-1	2N5847	
NE57835	MRF573		PG207		1N5139	PT8851		2N5847
NE59312	MM4049		PG210		MV1866	PT8851A	2N5847	

PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
PT8852		2N5848	PT9797A	MRF450A		SD1089	MRF646	
PT8852A	2N5848		PT9847		MRF412	SD1095		MRF840
PT8853		2N5849	R47M10	MHW709		SD1096		MRF842
PT8853A	2N5849		R47M13	MHW710		SD1098		MRF844
PT8854	MRF492		R47M15	MHW710		SD1099		MRF846
PT8854A	MRF492A		RF1003	MRF221		SD1115-2	MRF750	
PT8860	MRF230		RF1004	MRF223		SD1115-4	MRF607	
PT8861		MRF232	RF2081	MRF216		SD1124	MRF245	
PT8861A	MRF232		RF2092		MRF460	SD1127	MRF237	
PT8862		MRF233	RF2123	MRF238		SD1131	MRF629	
PT8862A	MRF233		RF2125		MRF450	SD1132-4	MRF750	
PT8863		MRF234	RF2127	MRF245		SD1133	MRF212	
PT8863A	MRF234		RF2135	MRF223		SD1133-1		MRF212
PT8864	MRF223		RF2142	2N6367		SD1134	2N5944	
PT8864A	2N6083		RF2143		MRF454	SD1134-1	MRF225	
PT8865		MRF247	RF2144	MRF224		SD1135	2N5945	
PT8866	MRF237		RF2146	MRF476		SD1136	2N5946	
PT8871		2N6080	RF2147	MRF475		SD1143	MRF212	
PT8871A		2N6080	S10-12	MRF433		SD1143-1		MRF212
PT8873	MRF221		S10-28	2N6370		SD1147	MRF5175	
PT8873A	2N6081		S15-12	MRF433		SD1148	MRF321	
PT8873F	MRF221		S15-28	2N6370		SD1149	MRF323	
PT8874	MRF224		S15-50	MRF427		SD1166	MRF403	
PT8874A	MRF240		S25-12	MRF406		SD1167	2N5847	
PT8874F	MRF224		S25-50	MRF427		SD1168	2N5848	
PT8877	MRF237		S30-28	MRF426		SD1169	2N5849	
PT8880	MRF586		S50-12	MRF450		SD1174	2N6255	
PT8889	MRF526		S50-28	MRF464		SD1177		2N5589
PT9073B	MRF321		S80-12	MRF454		SD1200	2N3866	
PT9700	MRF5174		S100-12	MRF421		SD1212-4		MRF476
PT9701	MRF5175		S100-28	MRF422		SD1212-7	MRF475	
PT9701B	MRF5175		S100-50	MRF428		SD1214-4		MRF475
PT9702	MRF323		S175-28		MRF422	SD1214-6	MRF479	
PT9702B	MRF323		S175-50		MRF428	SD1216	2N5591	
PT9703	MRF321		S200-50	MRF448		SD1218	MRF209	
PT9704		MRF5177A	SD1005	MRF587		SD1219		MRF316
PT9704A		MRF5177A	SD1006	MRF586		SD1220-1		2N5641
PT9704B		MRF5177A	SD1007-1	MRF587		SD1222-5		2N5642
PT9730		2N5641	SD1012	2N5590		SD1224-2		2N5643
PT9731	MRF314		SD1012-3		2N6080	SD1224-4		MRF466
PT9732	2N5641		SD1013		MRF340	SD1224-10	MRF426	
PT9733	MRF315		SD1013-3		2N5642	SD1229	2N6083	
PT9734	MRF314		SD1014	MRF233		SD1229-1	MRF222	
PT9776	MRF455		SD1014-1	MRF221		SD1232	MRF517	
PT9776A	MRF455A		SD1015	MRF315		SD1242-5		2N5641
PT9780	MRF464		SD1018-4	MRF224		SD1244-6		2N5642
PT9780A		MRF464A	SD1018-6	MRF224		SD1245		MRF321
PT9782		MRF317	SD1019		MRF317	SD1256		2N5589
PT9782A		MRF317	SD1019-5	2N6166		SD1262	MRF226	
PT9783	MRF466		SD1020	MRF402		SD1272	MRF239	
PT9783A		MRF466	SD1020-6	MRF313A		SD1272-2	MRF222	
PT9784	MRF455		SD1020-7	MRF313		SD1278	MRF240	
PT9784A	MRF455A		SD1068		MRF230	SD1285	MRF406	
PT9785	MRF421		SD1069		2N5847	SD1288	MRF453A	
PT9787	2N6370		SD1074	MRF453		SD1289	MRF453	
PT9787A		2N6370	SD1076	MRF454		SD1290	2N5849	
PT9788		MRF401	SD1077	MRF8004		SD1295	MRF421	
PT9788A	MRF401		SD1078	MRF454		SD1299	MRF326	
PT9790	MRF428		SD1080	MRF207		SD1300	BFY90	
PT9790A	MRF428A		SD1080-2	MRF628		SD1301	2N6304	
PT9795	MRF433		SD1080-4	MRF604		SD1303	2N3839	
PT9795A		2N6081	SD1080-6	MRF627		SD1308	MRF905	
PT9796	MRF449		SD1080-7	MRF626		SD1309	MM4049	
PT9796A	MRF449A		SD1087	MRF641		SD1315	MRF511	
PT9797	MRF450		SD1088	MRF644		SD1347-7	MRF402	

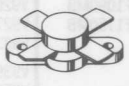
PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT	PART NO.	MOTOROLA DIRECT REPLACEMENT	MOTOROLA SIMILAR REPLACEMENT
SD1375	2N4957		SD1536	MRF1090MA		VMIL80FT	MRF172	
SD1377		MRF1000MA/B	SD1538	MRF1150MA		VMIL120FT	MRF174	
SD1402		MRF559	SD1540	MRF1325M		VMOB-70	MRF247	
SD1403	MRF428		SD1544		MRF2001M	V7		1N5441A
SD1404	MRF427		SD1545		MRF2003M	V7E		1N5138
SD1405	MRF458		TH416	MRF435		V10		1N5443A
SD1407		MRF422	TH417		MRF435	V10E		1N5140
SD1409		MRF338A	TH430	MRF448		V12		1N5444A
SD1410	MRF841		TH476		MRF5174	V12E		1N5141
SD1410-3	MRF840		TH478		MRF321	V15		MV830
SD1411		MRF842	TH480		MRF321	V15E		1N5142
SD1411-1	MRF842		TH513	MRF428		V20		1N5447A
SD1412		MRF842	TH518		MRF426A	V20E		1N5467A
SD1412-3	MRF842		TH519		2N6439	V27		MV833
SD1414	MRF846		TH525	MRF323		V27E		1N5145
SD1415	MRF216		TH526	MRF5177A		V33		MV834
SD1416	MRF247		TH1002	MRF2003B		V33E		1N5146
SD1418	MRF842		TH1005	MRF2005B		V39		MV835
SD1421	MRF842		TH1010	MRF2010B		V39E		1N5147
SD1424	MRF449A		TH2001	MRF2001B		V47		MV836
SD1425	MRF8004		TH2003	MRF2003B		V47E		1N5148
SD1427	MRF243		TH2005	MRF2005B		V56		MV857
SD1428	MRF216		THA13	MRF426A		V56E		1N5473A
SD1429	MRF641		THA15	MRF429		V68		MV838
SD1429-3	MRF641		THA93	MRF314A		V68E		1N5474A
SD1433	2N5946		THB13		MRF426A	V82		MV839
SD1434	MRF646		THY94	MRF315A		V82E		1N5457A
SD1438		MRF317	THX15	MRF428A		V100		MV840
SD1444	MRF629		TP312	BFR96		V100E		1N5476A
SD1446	MRF492		TP390	BFW92A		V900		1N5456A
SD1449	MRF421		TP393	BFR91		V900E		1N5476A
SD1450	MRF435		TP394	BFR96		V907		1N5441A
SD1451	MRF453		TP491	BFR91		V907E		1N5139
SD1452	MRF458		TPM4040		MRF390	V910		1N5443A
SD1460	MRF648		TPM4100		MRF392	V910E		1N5140
SD1461		MRF313A	TPM4130		MRF392	V912		1N5444A
SD1462		MRF313A	TPR10		MRF1015MB	V915		1N5445A
SD1464		MRF325	TPR50		MRF1090MB	V920		1N5447A
SD1465		MRF5177A	TPR150		MRF1150MB	V927		1N5449A
SD1466		MRF326	TRW2001	MRF2001		V933		1N5450A
SD1467	MRF326		TRW2003	MRF2003		V939		1N5451A
SD1468	MRF327		TRW2005	MRF2005		V956		1N5453A
SD1469		MRF328	TRW2010	MRF2010		V968		1N5454A
SD1477	MRF245		TRW2015	MRF2016M		V982		1N5455A
SD1480		MRF317	TRW2020		MRF2016M	V996		2N6603
SD1482		MRF752	TSP150		MRF1150MA			
SD1487	MRF316		TSP350		MRF1325M			
SD1488	MRF646		TZ9401		MWA110			
SD1499	MRF338		TZ9402		MWA120			
SD1499-1	MRF648		TZ9403		MWA230			
SD1510		MRF1035MA/B	TZ9404		MWA230			
SD1511		MRF1035MA/B	UMIL-60	2N6439				
SD1512		MRF1090MA/B	UMIL-70	MRF327				
SD1513		MRF1090MA/B	UMIL-100	MRF329				
SD1514		MRF1150MA/B	UMIL-100A		MRF329			
SD1520	MRF1000MA		UMOB-45	MRF646				
SD1522	MRF1000MA		UMOB-55	MRF648				
SD1522-2		MRF1002MA	VAM-40		2N5643			
SD1522-4	MRF1002MA		VAM-80		MRF316			
SD1524		MRF1002MA	VAM-120		MRF317			
SD1526		MRF1004MA	VMIL-50	MRF317				
SD1528	MRF1015MA		VMIL-100	MRF317				
SD1530	MRF1035MA		VMIL20FT	MRF137				
SD1532	MRF1090MA		VMIL40FT	MRF171				
SD1534	MRF1090MA		VMIL60FT	MRF172				

RF Power TMOS FETs

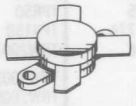
RF Power FETs provide high gain, improved high order intermodulation distortion, high input impedance, and built-in gain control for ALC and manual power output control. The FETs listed in these tables are specified for operation in RF Power Amplifiers and are listed by specific application at a given test frequency. Arrangement within each application group is in the order of increasing supply voltage then output power. Modulation type is given in each application heading. All devices are NPN polarity except where otherwise noted.

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{ps} Typical Gain dB	Typical IMD		V_{DD} Supply Voltage	Package
				d_3 dB	d_{11} dB		
1.5–150 MHz HF/SSB FETs							
These linear RF TMOS Field-Effect Transistors are designed for military and commercial HF/SSB fixed, mobile, and marine transmitters operating from either 28 or 50 volt power supplies. These devices are fully characterized at 30 MHz.							
MRF138	30	0.6	17	−30	−60	28	211-07
MRF140	150	4.7	15	−30	−60	28	211-11
MRF148	30	0.5	18	−35	−60	50	211-07
MRF150	150	2.9	17	−32	−60	50	211-11

Device	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{ps} Minimum Gain dB	VL Minimum Efficiency %	V_{DD} Supply Voltage	Package
2–200 MHz VHF AM/FM FETs						
These RF TMOS Field-Effect Transistors are designed for VHF military and commercial aircraft radio transmitters. These transistors are fully characterized at 150 MHz.						
MRF134	5.0	0.40	11	50	28	211-07
MRF136	15	0.75	13	50	28	211-07
MRF137	30	1.9	12	50	28	211-07
MRF171	45	2.8	12	50	28	211-07
MRF172	80	8.0	10	50	28	211-11
MRF174	125	15.8	9.0	50	28	211-11



CASE 211-07
(.380" FLANGE)



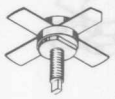
CASE 211-11
(.500" FLANGE)

RF Power Bipolar Transistors

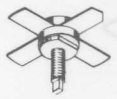
Motorola's broad line of bipolar RF Power Transistors are designed for operation in RF Power Amplifiers. These transistors are specified for HF, VHF, UHF, 800 MHz, and Microwave applications in military and commercial land mobile, avionics, and marine transmitters. Arrangement within each application group is in the order of increasing supply voltage then output power. Modulation type is given in each application heading. All devices are NPN polarity except where otherwise noted.

HF Bipolar Power Transistors

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
1.5–30 MHz, HF/SSB TRANSISTORS					
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.					
MRF433	12.5 PEP/CW	0.125	20	12.5	211-07
MRF406	20 PEP/CW	1.25	12	12.5	211-07
MRF460	40 PEP/CW	2.5	12	12.5	211-11
MRF421	100 PEP/CW	10	10	12.5	211-11
MRF412	70 PEP/CW	3.5	13	13.6	211-11
2N6370	10 PEP/CW	0.62	12	28	211-07
MRF401	25 PEP/CW	1.25	13	28	145A-09
MRF426	25 PEP/CW	0.16	22	28	211-07
MRF426A	25 PEP/CW	0.16	22	28	145A-09
MRF466	40 PEP/CW	1.25	15	28	211-09
MRF464	80 PEP/CW	2.53	15	28	211-11
MRF464A	80 PEP/CW	2.53	15	28	145A-10
MRF422	150 PEP/CW	15	10	28	211-11
MRF435	150 PEP/CW	15	10	28	211-11
MRF427	25 PEP/CW	0.40	18	50	211-11
MRF427A	25 PEP/CW	0.40	18	50	145A-10
MRF428	150 PEP/CW	7.5	13	50	211-11
MRF429	150 PEP/CW	7.5	13	50	211-11
MRF448	250 PEP/CW	15.7	12	50	211-11



CASE 145A-09
(.380″ STUD)



CASE 145A-10
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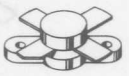
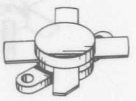


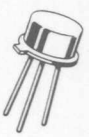
CASE 211-07
CASE 211-09
(.380″ FLANGE)



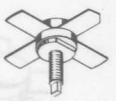
CASE 211-11
(.500″ FLANGE)

HF BIPOLAR POWER TRANSISTORS (continued)

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
14–30 MHz, CB/AMATEUR TRANSISTORS These HF transistors are designed for economical, high-volume use in CW, AM and SSB applications.					
MRF8003	0.5	0.05	10	12.5	TO-39
MRF8004	3.5	0.35	10	12.5	TO-39
MRF453	60	3.0	13	12.5	211-11
MRF455	60	3.0	13	12.5	211-07
MRF455A	60	3.0	13	12.5	145A-09
MRF458	80	5.0	12	12.5	211-11
MRF454	80	5.0	12	12.5	211-11
MRF454A	80	5.0	12	12.5	145A-10
MRF449A	30	1.9	12	13.6	145A-09
MRF450	50	4.0	11	13.6	211-09
MRF450A	50	4.0	11	13.6	145A-09
27–50 MHz, LOW-BAND FM TRANSISTORS For use in the FM "Low-Band," for Mobile communications.					
MRF402	1.0	0.1	10	12.5	TO-39
MRF492	70	5.6	11	12.5	211-11

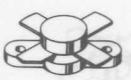


CASE 79-02
TO-205AD
(TO-39)

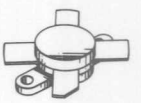


CASE 145A-09
(.380" STUD)

CASE 145A-10
(.500" STUD)



CASE 211-07
CASE 211-09
(.380" FLANGE)

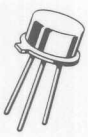


CASE 211-11
(.500" FLANGE)

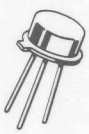
VHF Bipolar Power Transistors

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
30–200 MHz VHF AM/FM TRANSISTORS					
Designed for Military Radio and Commercial Aircraft VHF bands, these 28-volt devices include the all-gold metalized MRF314/15/16/17 high-reliability series.					
2N3866	1.0	0.1	10	28	TO-39
2N3553	2.5	0.25	10	28	TO-39
2N5641	7.0	1.0	8.4	28	144B-05
2N5642	20	3.0	8.2	28	145A-09
MRF314	30	3.0	10	28	211-07
MRF314A	30	3.0	10	28	145A-09
2N5643	40	6.9	7.6	28	145A-09
MRF315	45	5.7	9.0	28	211-07
MRF315A	45	5.7	9.0	28	145A-09
MRF316**	80	8.0	10	28	316-01
MRF317**	100	12.5	9.0	28	316-01
66–88 MHz, MIDBAND FM TRANSISTORS					
Power output chains up to 25 watts output are obtainable in the international VHF FM "Mid-Band" for which these transistors are optimized.					
MRF229*	1.5	0.15	10	12.5	TO-39
MRF230	1.5	0.15	10	12.5	TO-39
MRF231	3.5	0.15	10	12.5	145A-09
MRF232	7.5	0.95	9.0	12.5	145A-09
MRF233	15	1.5	10	12.5	145A-09
MRF234	25	2.8	9.5	12.5	145A-09

*Grounded Emitter TO-39
**Internal Impedance Matched

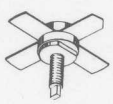


CASE 79-02
TO-205AD
(TO-39)

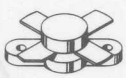


CASE 79-03
(TO-39 CE)

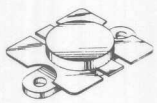
CASE 144B-05
(.380" STUD)



CASE 145A-09
(.380" STUD)



CASE 211-07
CASE 211-09
(.380" FLANGE)



CASE 316-01

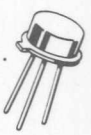
VHF BIPOLAR POWER TRANSISTORS (continued)

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
136–174 MHz, HIGH-BAND/VHF FM TRANSISTORS The "workhorse" VHF FM High-Band is served by Motorola with the broadest range of devices and package combinations in the industry.					
2N4427	1.0	0.1	10	12	TO-39
MRF604	1.0	0.1	10	12.5	TO-46
MRF607	1.75	0.12	11.5	12.5	TO-39
2N6255	3.0	0.5	7.8	12.5	TO-39
MRF237*	4.0	0.25	12	12.5	TO-39
2N6080	4.0	0.25	12	12.5	145A-09
MRF212	10	1.25	9.0	12.5	145A-09
2N6081	15	3.5	6.3	12.5	145A-09
MRF221	15	3.5	6.3	12.5	145A-09
2N6082	25	6.0	6.2	12.5	145A-09
2N6083	30	8.1	5.7	12.5	211-07
2N6084	40	14.3	4.5	12.5	145A-09
MRF224	40	14.3	4.5	12.5	211-07
MRF4070	70	20	5.0	12.5	316-01
MRF247**	75	15	7.0	12.5	316-01
2N5589	3.0	0.44	8.2	13.6	144B-05
2N5590	10	3.0	5.2	13.6	145A-09
2N5591	25	9.0	4.4	13.6	145A-09
MRF238	30	3.7	9.0	13.6	145A-09
MRF239	30	3.0	10	13.6	145A-09
MRF240	40	5.0	9.0	13.6	145A-09
225 MHz, AMATEUR FM TRANSISTORS Specifically designed and characterized for the 225-MHz band, these devices eliminate the guesswork required when adapting 175 MHz characterized devices to this application.					
MRF207	1.0	0.15	8.2	12.5	TO-39
MRF225	1.5	0.18	9.0	12.5	TO-39
MRF227*	3.0	0.13	13.5	12.5	TO-39
MRF208	10	0.1	10	12.5	145A-09
MRF226	13	1.6	9.0	12.5	145A-09

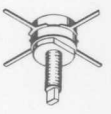
*Grounded Emitter TO-39
**Internal Impedance Matched

CASE 26-03
TO-206AB
(TO-46)

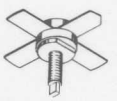
CASE 79-02
TO-205AD
(TO-39)



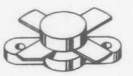
CASE 79-03
(TO-39 CE)



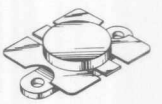
CASE 144B-05
(.380" STUD)



CASE 145A-09
(.380" STUD)



CASE 211-07
CASE 211-09
(.380" FLANGE)



CASE 316-01

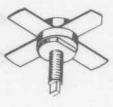
UHF Bipolar Power Transistors

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
225–400 MHz, AM TRANSISTORS					
Stringent requirements of the UHF Military band are met by MRF313, 321, 331, 325, 326, 327, 329 and 2N6439 types, with all-gold metal systems, ruggedness, and "CQ" programmed wirebond construction, to assure consistent input impedances.					
MRF525*	0.02	0.001	13	26	TO-39
2N4428	25	.075	10	28	TO-39
2N5160†	1.0	0.16	8.0	28	TO-39
2N3866	1.0	0.1	10	28	TO-39
MRF313	1.0	0.03	15	28	305A-01
MRF313A	1.0	0.03	15	28	305-01
MRF5174	2.0	0.125	12	28	244-04
MRF321**	10	0.62	12	28	244-04
MRF331	10	1.6	8.0	28	244-04
MRF323**	20	2.0	10	28	244-04
MRF5177	30	7.5	6.0	28	215-02
MRF5177A	30	7.5	6.0	28	145A-09
MRF325**	30	4.3	8.5	28	316-01
MRF326**	40	8.0	9.0	28	316-01
MRF309	50	10	7.0	28	316-01
2N6439	60	10	7.8	28	316-01
MRF390***	60	6.8	9.5#	28	744-02
MRF327**	80	14.9	7.3	28	316-01
MRF329**	100	20	7.0	28	333-03

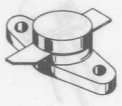
*Grounded Emitter TO-39 Package
**Internal Impedance Matched
***Internal Impedance Matched Push Pull Transistors
#Typical
†PNP

CASE 79-02
TO-205AD
(TO-39)

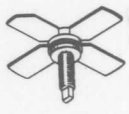
CASE 79-03
(TO-39 CE)



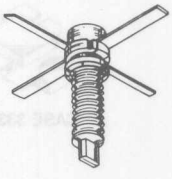
CASE 145A-09
(.380" STUD)



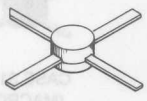
CASE 215-02



CASE 244-04
(.280" STUD)

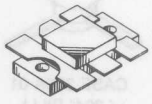


CASE 305-01
(.204" STUD)

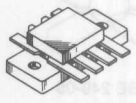


CASE 305A-01
(.204" PILL)

CASE 316-01



CASE 333-03



CASE 744-02

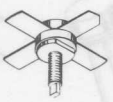
UHF Bipolar Power Transistors (continued)

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
407–512 MHz, UHF FM TRANSISTORS					
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.					
MRF750	0.5	0.05	10	7.5	305A-01
MRF752	2.5	0.4	8.0	7.5	249-05
MRF754	8.0	2.0	6.0	7.5	249-05
MRF627	0.5	0.05	10	12.5	305A-01
MRF559	0.5	0.025	13	12.5	317-01
MRF581	0.6	0.023	14	12.5	317-01
MRF515	0.75	0.12	8.0	12.5	TO-39
2N5644	1.0	0.20	7.0	12.5	145A-09
MRF629*	2.0	0.32	8.0	12.5	TO-39
2N5944	2.0	0.25	9.0	12.5	244-04
MRF630*	3.0	0.33	9.5	12.5	TO-39
2N5945	4.0	0.64	8.0	12.5	244-04
MRF652	5.0	0.50	10	12.5	244-04
2N5946	10	2.5	6.0	12.5	244-04
MRF641**	15	3.75	7.8	12.5	316-01
MRF644**	25	5.9	6.2	12.5	316-01
MRF646**	40	13.3	4.8	12.5	316-01
MRF648**	60	22	4.4	12.5	316-01
MRF338**	80	15	7.3	28	333-03

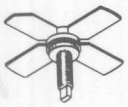
*Grounded Emitter TO-39 Package
**Internal Impedance Matched

CASE 79-02
TO-205AD
(TO-39)

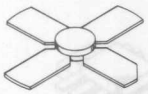
CASE 79-03
(TO-39 CE)



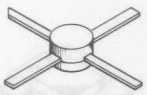
CASE 145A-09
(.380″ STUD)



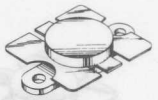
CASE 244-04
(.280″ STUD)



CASE 249-05
(.280″ PILL)

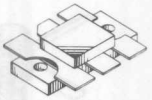


CASE 305A-01
(.204″ PILL)



CASE 316-01

CASE 317-01
(MACRO-X)

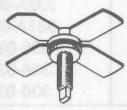


CASE 333-03

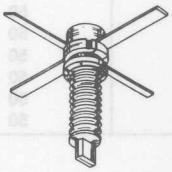
800 MHz Bipolar Power Transistors

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PE} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
806–960 MHz, FM TRANSISTORS					
Designed specifically for the 800 MHz mobile radio band, types MRF840 through 846 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.					
MRF559	0.50	0.080	8.0	12.5	317-01
MRF581	0.6	0.06	10#	12.5	317-01
MRF838	1.0	0.22	6.5	12.5	305A-01
MRF838A	1.0	0.22	6.5	12.5	305-01
MRF870	3.0	1.0	5.0	12.5	305A-01
MRF870A	3.0	1.0	5.0	12.5	305-01
MRF841 @	5.0	0.70	8.5	12.5	244-04
MRF840 @	10	2.5	6.0	12.5	319-04
MRF842 @	20	5.0	6.0	12.5	319-04
MRF844 @	30	9.0	5.2	12.5	319-04
MRF846 @	40	15	4.3	12.5	319-04
MRF890	2.0	0.25	9.0	24	305-01
MRF892 @	14	2.0	8.5	24	319-04
MRF894 @	30	6.0	7.0	24	319-04

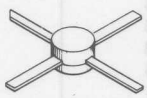
@ Common Base
#Typical



CASE 244-04
(.280" STUD)

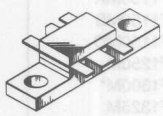


CASE 305-01
(.204" STUD)



CASE 305A-01
(.204" PILL)

CASE 317-01
(MACRO-X)

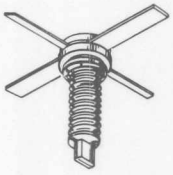


CASE 319-04
(CS-12)

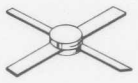
Microwave Bipolar Power Transistors

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PB} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
L-BAND PULSED POWER					
These products are designed to operate in short pulse width, 10 μs, low duty cycle, 1%, power amplifiers operating in the 960 to 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). All devices offered with hermetic option.					
MRF1000MA##	0.20	0.02	10	18	332-02
MRF1000MB##	0.20	0.02	10	18	332A-02
MRF1000MC	0.20	0.02	10	18	361A-01
MRF1002MA	2.0	0.20	10	35	332-02
MRF1002MB	2.0	0.20	10	35	332A-02
MRF1002MC	2.0	0.20	10	35	361A-01
MRF1004MA	4.0	0.40	10	35	332-02
MRF1004MB	4.0	0.40	10	35	332A-02
MRF1004MC	4.0	0.40	10	35	361A-01
MRF1008MA	8.0	0.80	10	50	332-02
MRF1008MB	8.0	0.80	10	50	332A-02
MRF1008MC	8.0	0.80	10	50	361A-01
MRF1015MA	15	1.5	10	50	332-02
MRF1015MB	15	1.5	10	50	332A-02
MRF1015MC	15	1.5	10	50	361A-01
MRF1035MA	35	3.5	10	50	332-02
MRF1035MB	35	3.5	10	50	332A-02
MRF1035MC	35	3.5	10	50	361A-01
MRF1090MA	90	9.0	10	50	332-02
MRF1090MB	90	9.0	10	50	332A-02
MRF1090MC	90	9.0	10	50	361A-01
MRF1150M	150	25	7.8	50	336-03
MRF1150MA	150	25	7.8	50	332-02
MRF1150MB	150	25	7.8	50	332A-02
MRF1150MC	150	25	7.8	50	361A-01
MRF1250M	250	63	6.0	50	336-03
MRF1300M*	300	75	6.0	50	336-03
MRF1325M	325	81	6.0	50	336-03

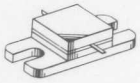
##Class A Common Emitter
*To be introduced



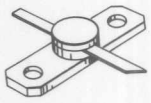
CASE 332-02
(.380″ STUD)



CASE 332A-01
(.380″ STUD)



CASE 336-03

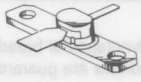


CASE 361A-01

MICROWAVE BIPOLAR POWER TRANSISTORS (continued)

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	G_{PB} Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
1.7–2.3 GHz BROADBAND CW					
The MRF2000M Series of transistors have internal input impedance matching networks which facilitate broadband circuit designs in the 1.7 to 2.3 GHz telecommunications band. The devices are designed for Class B and C common base amplifier applications.					
MRF2001M	1.0	0.14	8.5	24	337-02
MRF2003M	3.0	0.48	8.0	24	337-02
MRF2005M	5.0	0.89	7.5	24	337-02
MRF2010M	10	2.0	7.0	24	337-02
MRF2016M	16	3.6	6.5	24	337-02
2.0 GHz NARROWBAND CW					
The MRF2000 Series of NPN Silicon microwave power transistors are designed for common base service in amplifier or oscillator applications in the 1.0 to 2.3 GHz frequency range.					
MRF2001	1.0	0.13	9.0	28	328A-01
MRF2001B	1.0	0.13	9.0	28	328-02
MRF2003	3.0	0.5	7.8	28	328A-01
MRF2003B	3.0	0.5	7.8	28	328-02
MRF2005	5.0	0.8	8.0	28	328A-01
MRF2005B	5.0	0.8	8.0	28	328-02
MRF2010	10	2.5	6.0	28	328A-01
MRF2010B	10	2.5	6.0	28	328-02

CASE 328-02



CASE 328A-01

CASE 337-02

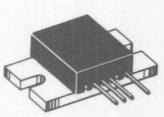
Hybrid Amplifiers

Motorola's Hybrid Amplifiers allow compact simple designs due to their impedance matching and small size. Their consistency and reliability stem from thin-film hybrid construction, all gold metallization, laser-trimmed nichrome resistors and MOS capacitors. These hybrids are designed and specified for land mobile power, CATV distribution, and general purpose wideband amplifiers.

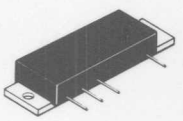
Land Mobile Hybrid Power Amplifiers

Device Type	P_{out} Output Power Watts	P_{in} Input Power Watts	f Frequency MHz	G_p Power Gain dB Min	V_{CC} Supply Voltage Volts	Package
407–512 MHz, UHF FM MODULES						
UHF Modules reduce costs of assembly, testing, inventory and maintenance, while producing consistent performance free of the critical physical design problems associated with these frequencies. Their consistency and reliability stem from the use of thin-film gold metallization, laser-trimmed nichrome resistors and MOS capacitors.						
MHW401-1	1.5	0.047	400–440	15	7.5	301-01
MHW401-2	1.5	0.047	440–470	15	7.5	301-01
MHW401-3	1.5	0.047	470–512	15	7.5	301-01
MHW709-1	7.5	0.10	400–440	18.8	12.5	700-03
MHW709-2	7.5	0.10	440–470	18.8	12.5	700-03
MHW709-3	7.5	0.10	470–512	18.8	12.5	700-03
MHW710-1	13	0.15	400–440	19.4	12.5	700-03
MHW710-2	13	0.15	440–470	19.4	12.5	700-03
MHW710-3	13	0.15	470–512	19.4	12.5	700-03
MHW720-1	20	0.15	400–440	21	12.5	700-03
MHW720-2	20	0.15	440–470	21	12.5	700-03
MHW720A1††	20	0.15	400–440	21	12.5	700-03
MHW720A2††	20	0.15	440–470	21	12.5	700-03
806–960 MHz, UHF FM MODULES						
The cost saving reproducability and packaging density advantages of broadband hybrid amplifier modules become very attractive in the 800 MHz mobile band. Bandwidth, stability and ruggedness are guaranteed together with the long established reliability of thin film hybrid construction.						
MHW808-1	7.5	0.25	806–870	14.8	12.5	297A-05
MHW808-2	7.5	0.25	806–890	14.8	12.5	297A-05
MHW808-3	7.5	0.35	870–950	13.3	12.5	297A-05
MHW808A1††	7.5	0.03	806–870	24	12.5	301C-01
MHW808A2††	7.5	0.03	806–890	24	12.5	301C-01
MHW808A3††	7.5	0.04	870–950	22.7	12.5	301C-01
MHW820-1	20	0.25	806–870	19	12.5	301B-02
MHW820-2	20	0.25	806–890	19	12.5	301B-02
MHW820-3	20	0.35	870–950	17.6	12.5	301B-02

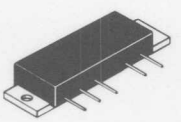
††Designed for Wide Range P_{out} Level Control



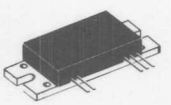
CASE 297A-05



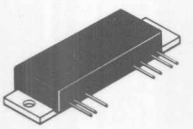
CASE 301-01



CASE 301B-03



CASE 301C-02



CASE 700-03

CATV Distribution Hybrid Amplifiers

All-Gold metallization of Motorola's CATV Hybrid Modules enhances reliability by reducing the failures associated with dissimilar-metal bonding. Chip geometries are optimized to reduce distortion products, and hybrid structures are designed to produce "signature-free" response for long cascades. The package for these modules is Case 714-02.

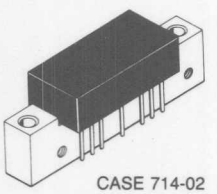
Device Type	Hybrid Gain (Nominal) dB	Channel Loading Capacity	Maximum Distortion Specifications						Noise Figure @ 330 MHz dB	
			Output Level dBmV	2nd Order Test Note 1 dB	Composite Triple Beat dB		Cross Modulation dB			
					35 CH	40 CH	35 CH	40 CH	Max	Typ
FORWARD AMPLIFIERS TO 40 CHANNELS — 330 MHz										
MHW1121	12	35	+50	−68	−51	−49#	−51	−49#	7.0	6.0
MHW1122	12	35	+50	−70	−56	−54#	−51	−54#	8.0	6.5

FORWARD AMPLIFIERS TO 60 CHANNELS — 450 MHz									@ 450 MHz	
				Note 2	53 CH	60 CH	53 CH	60 CH	Max	Typ
MHW5122	12	60	+46	−70	−61	−58	−62	−61	9.0	8.0
MHW5171	17	60	+46	−70	−58	−55	−58	−57	6.5	5.5
MHW5172	17	60	+46	−70	−61	−58	−61	−60	7.0	6.0
MHW5181	18	60	+46	−72	−58	−55	−59	−58	6.5	5.5
MHW5182	18	60	+46	−72	−62	−59	−62	−61	7.0	6.0
MHW5222	22	60	+46	−68	−57	−54#	−54	−54#	7.0	6.0
MHW5342	34	60	+46	−70	−61	−58	−61	−59	6.0	5.0

REVERSE AMPLIFIERS — 300 MHz								@ 175 MHz	
					22 CH	12 CH	22 CH	Max	Typ
MHW1134	13	22	+50	−72	−73	−70#	−65	7.0	6.0
MHW1184	18	22	+50	−72	−72	−68#	−64	5.5	5.0
MHW1224	22	22	+50	−72	−71	−67#	−62	5.5	5.0
MHW1244	24	22	+50	−72	−70	−66#	−61	5.0	4.5

Notes: 1. Channels (2 and 13) @ R
2. Channels (2 and M6) @ M15
Typical
3. Additional specifications can be created for European customers such as:
   - DIN 45004B Data at 300/400/450 MHz.
   - Better Input/Output return loss data for 40-300MHz
   - Noise figure at 300 MHz.
   - 2nd order IMD data at 300 MHz and 50 dBmV Vout.
   - Slope and gain data can be slightly modified according customer requirements.

   These modules will have a part number SHWE..... which will be assigned for customers with acceptable quantities.



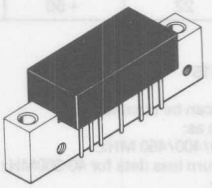
CASE 714-02

General-Purpose Wideband Hybrid Amplifiers

Device Type	Frequency Range MHz	Gain dB Min/Typ	Supply Voltage Vdc	Output Level 1 dB Compression mW/f (MHz)	Noise Figure @ 250 MHz dB
50 Ω–100 Ω WIDEBAND AMPLIFIERS (Case 714-02)					
The general purpose hybrid amplifiers listed are for broadband system applications requiring superior gain and current stability with temperature. The 50 to 100 ohm input and output impedances help simplify designs.					
MHW591	1.0–250	35/36.5	13.6	700/100	5.0
MHW593	10–400	34/35.5	13.6	600/200	4.5
MHW590	10–400	32.5/34	24	800/200	5.0
MHW592	1.0–250	34.5/36	24	900/100	5.0

50 Ω TO-39 (Case 31A-01)					
The MWA Series features excellent gain versus frequency flatness, temperature stability and are cascadable for high gain lineups. Construction techniques include thin film gold metal circuitry and hermetic TO-39 package. MWA devices processed similarly to MIL-S-883, Method 5004.4, Class B, are available to special order.					
				dBm Typ	dB Typ
MWA110	0.1–400	13/14	2.9	−2.5	4.0
MWA120	0.1–400	13/14	5.0	+8.2	5.5
MWA130	0.1–400	13/14	5.5	+18	7.0
MWA210	0.1–600	9/10	1.75	+1.5	6.0
MWA220	0.1–600	9/10	3.2	+10.5	6.5
MWA230	0.1–600	9/10	4.4	+18.5	7.5
MWA310	0.1–1000	7/8	1.60	+3.5	6.5
MWA320	0.1–1000	7/8	2.9	+11.5	6.7
MWA330	0.1–1000	—/6.2	4.0	+15.2	9.0

CASE 31A-01
TO-39 TYPE



CASE 714-02

RF Small-Signal Transistors

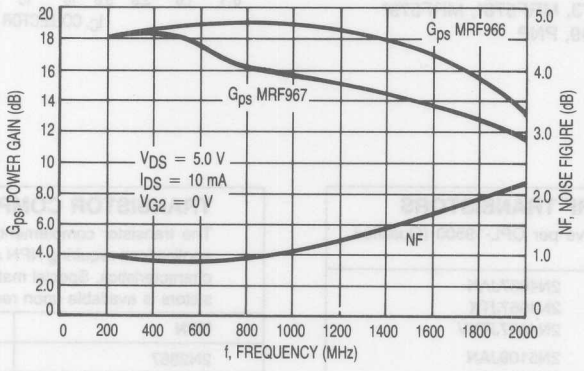
Motorola's broad line of RF Small-Signal Transistors include GaAs FETs and Bipolar Transistors characterized for low noise amplifiers, mixers, oscillators, multipliers, non-saturated switches and low-power drivers.

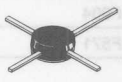
These devices are available in a wide variety of package types: metal can, plastic Macro-X and Macro-T, Micro-X, ceramic and surface mounted. Most of these transistors are fully characterized with y or s parameters; and in addition, QPL types with JAN, JTX and JTXV processing levels are available as well as Hi Rel processing to meet unique customer requirements.

	I_{DSS} Typ		Noise Figure			Gain		IMD_3	Output Level 1dB Compression				
Device Type	I_{DSS} (mA)	V_{DS}	NF dB	f MHz	I_D mA	dB Min	f MHz	dB	dBm	$V_{(BR)DSX}$	I_D mA	P_T mW	Package
GaAs DUAL GATE FETs (DEPLETION MODE)													
The GaAs Dual Gate N-Channel FETs shown here are for low noise and high gain receiver amplifier and mixer applications.													
MRF966	50	5.0	1.2#	1000	10	15	1000	−65#	10#	10	60	350	317-01
MRF967	50	5.0	1.2#	1000	10	13	1000	−65#	10#	10	60	350	358-01

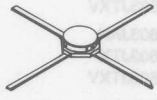
#Typical

COMMON SOURCE POWER GAIN AND NOISE FIGURE versus FREQUENCY





CASE 317-01
(MACRO-X)



CASE 358-01
(MICRO-X)

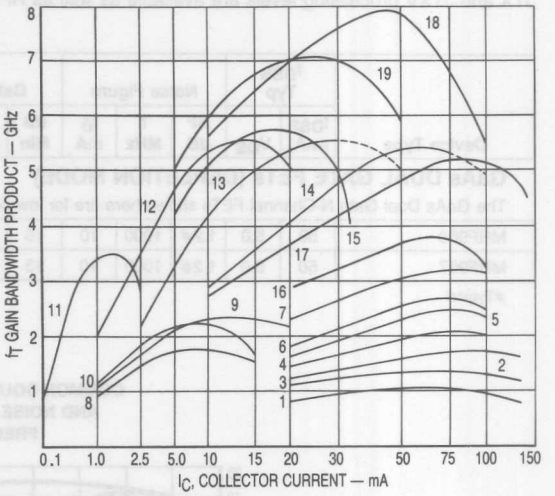
RF Small-Signal Bipolar Transistors

Typical Gain Bandwidth Versus Collector Current

Motorola small-signal and medium power RF transistors with gain-bandwidth products from 1.0 GHz to 8.0 GHz operate with currents from 0.25 mA to over 140 mA. The following chart, combined with the tables of package options, enables the circuit designer to select the optimum device from Motorola's wide range of transistor/package combinations.

1 2N3866, 2N3866A, MM8000
2 2N5160, MM4018, PNP
3 2N3948, 2N4427, MRF207
4 2N5109, 2N5943, MM8001, MM8002
5 2N5583, PNP
6 2N5836, 2N5837
7 MRF511, MRF517, MRF525
8 2N2857, 2N5179, MRF501, MRF502
9 2N6304, 2N6305, BFX89, BFY90
10 2N4957, 2N4958, 2N4959, PNP
11 MRF931
12 2N6603, BFR90, MRF901, MRF903*, MRF904, MRF908*; MRF909*
13 2N6604, BFR91, MRF911, MRF913*, MRF914, MRF918*; MRF919*
14 BFR96, MRF961, MRF962, MRF965
15 BFW92A
16 MRF559
17 MRF580, MRF581, MRF586, MRF587
18 MRF571, MRF572, MRF573, MRF578*, MRF579*
19 MRF536, MRF534, MM4049, PNP

*To be introduced



HIGH RELIABILITY RF TRANSISTORS

The listed devices are active per QPL-19500 (Qualified Products List).

2N2857JAN	2N4957JAN
2N2857JTX	2N4957JTX
2N2857JTXV	2N4957JTXV
2N3553JAN	2N5109JAN
2N3553JTX	2N5109JTX
2N3553JTXV	2N5109JTXV
2N3866JAN	2N5583JAN
2N3866JTX	2N55883JTX
2N3866JTXV	2N5583JTXV
2N3866AJAN	2N6603JAN
2N3866AJTX	2N6603JTX
2N3866AJTXV	2N6603JTXV
2N3959JAN	2N6604JAN
2N3959JTX	2N6604JTX
2N3959JTXV	2N6604JTXV
2N3960JAN	
2N3960JTX	
2N3960JTXV	

TRANSISTOR COMPLEMENTS

The transistor complements listed are suitable for most applications requiring NPN and PNP devices of similar RF characteristics. Special matching of complementary transistors is available upon request.

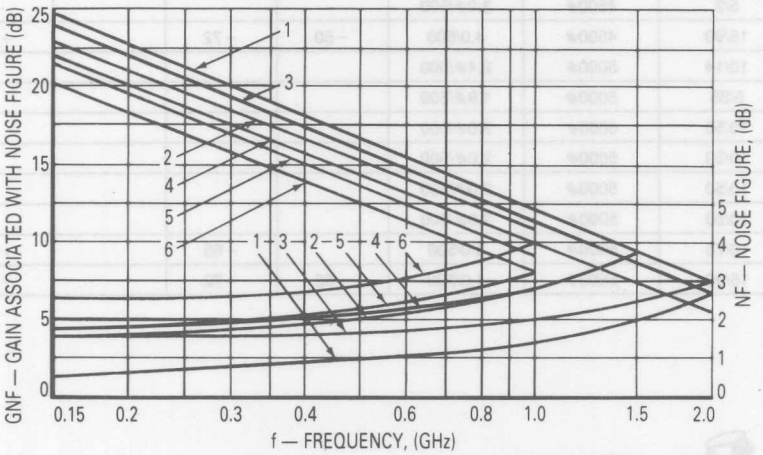
NPN	PNP
2N2857	2N4958
2N3553	MM4019
2N3866	2N5160
2N5943	2N5583
MRF904	MM4049
MRF571	MRF536

Low Noise Transistors (continued)

NPN (unless otherwise designated)

Curve Number	Bias Conditions (mA/V)	Macro-T Case 317A-01	Macro-X Case 317-01	Case 303-01	Micro-X Case 358-01	TO-72 Case 20-03	TO-46 Case 26-03	TO-92 Case 029-02	SOT-23 Case 318-02
LOW-NOISE TRANSISTORS 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.									
1	5.0/6.0	—	MRF571	MRF572	MRF573	—	—	MRF578*	MRF579*
2	50.0/10.0	MRF580	MRF581	—	—	—	—	—	—
3	5.0/10.0	—	MRF901	2N6603	MRF903*	MRF904	MRF905	MRF908*	MRF909*
4	5.0/10.0	BFR91	MRF911	2N6604	MRF913*	MRF914	—	MRF918*	MRF919*
5	10.0/10.0	BFR96	MRF961	MRF962	—	—	MRF965	—	—
6†	3.0/5.0	—	MRF536	—	—	MM4049	—	MRF538*	MRF539*

†PNP
*To Be Introduced

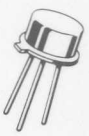


Device Type	Nominal Test Conditions V_{CE}/I_C Volts/mA	f_T MHz Min	Noise Figure Max/Freq. dB/MHz	Distortion Specifications 2nd Order IMD	3rd Order IMD	12 Ch. Cross-Mod.	Output Level dBmV	Package
CATV, MATV, AND CLASS A LINEAR TRANSISTORS The devices listed below are excellent for Class A linear CATV/MATV applications and are listed according to increasing gain-bandwidth (f_T).								
MRF501	6/5	600	4.5#/200					TO-72
MRF502	6/5	800	4.0#/200					TO-72
2N5179	6/5	900	4.5/200					TO-72
BFY90	5/2	1000	5.0/500					TO-72
2N6305	5/10	1200	5.5/450					TO-72
BFX89	5/25	1200	6.5/500					TO-72
2N5109	15/50	1200	3.0#/200					TO-39
2N5943	15/50	1200	3.4/200	−50		−42	+50	TO-39
2N6304	5/10	1400	4.5/450					TO-72
MRF511	20/80	1500	7.3#/200	−50	−65	−57	+50	TO-117
2N5947	20/75	1500#	3.8/200		−55	−60	+50	TO-117
MRF517	15/60	2200	7.5/300	−60	−72	−57	+45	TO-39
BFW92A	5/2	4500#	3.0#/500					317A-01
MRF586	15/90	4500#	4.0/500	−50	−72		+50	TO-39
BFR90	10/14	5000#	2.4#/500					317A-01
BFR91	5/35	5000#	1.9#/500					317A-01
BFR96	10/50	5000#	3.0#/500					317A-01
MRF961	10/50	5000#	2.0#/500					317-01
MRF962	10/50	5000#	2.0#/500					303-01
MRF965	10/50	5000#	2.0#/500					TO-46
MRF581	10/75	5000#	3.0/500		−65		+50	317-01
MRF587	15/90	5500#	4.0/500	−52	−72		+50	TO-117

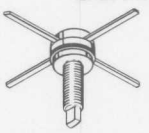
#Typical

CASE 20-03
TO-206AF
(TO-72)

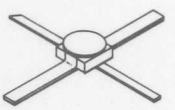
CASE 26-03
TO-206AB
(TO-46)



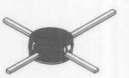
CASE 79-02
TO-205AD
(TO-39)



CASE 244A-01
(TO-117)



CASE 303-01
(.100" CERAMIC)



CASE 317-01
(MACRO-X)

CASE 317A-01
(MACRO-T)

Device Type	Test Conditions I_C/V_{CE} mA/Volts	f_T MHz Min	$r_b C_C$ Max	Package
HIGH-SPEED SWITCHES				
The transistors listed below are for use as high-frequency current-mode switches. They are also suitable for RF amplifier and oscillator applications. The devices are listed in ascending order of collector current. These devices are NPN polarity unless otherwise designated.				
2N3959	10/10	1300	25	TO-18
2N3960	10/10	1600	40	TO-18
2N5835	10/6.0	2500	5.0#	TO-72
MM4049†	20/5.0	4000	15	TO-72
MRF914	20/10	4500#	—	TO-72
2N5943	50/15	1200	5.5#	TO-39
2N5583†	50/10	1000	8.0#	TO-39
2N5836	50/6.0	2000	6.0#	TO-46
2N5837	100/3.0	1700	6.0#	TO-46

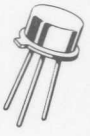
†PNP
#Typical

Device Type	Test Conditions f MHz	Test Conditions V_{CC} Volts	P_{out} mW Min	f_T MHz Typ	Package
UHF AND MICROWAVE OSCILLATORS					
The transistors listed below are for UHF and microwave oscillator applications as initial signal sources or as output stages of limited range transmitters. Devices are listed in order of increasing output power.					
2N5179	500	10	20	1800	TO-72
2N2857	500	10	30	1800	TO-72
MM8009	1680	20	200	1400	TO-39
2N5108	1680	20	300	1400	TO-39
MRF905	1680	20	500#	2200	TO-46
2N3866	400	15	1000	1000	TO-39

CASE 20-03
TO-206AF
(TO-72)

CASE 22-03
TO-206AA
(TO-18)

CASE 26-03
TO-206AB
(TO-46)



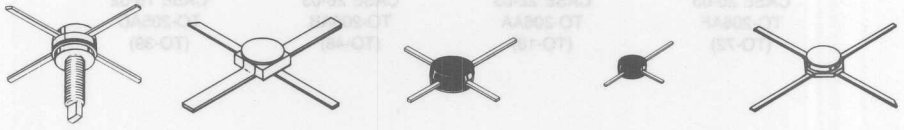
CASE 79-02
TO-205AD
(TO-39)

SMALL-SIGNAL TRANSISTORS 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 are 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.

	Gain — BW		Noise Figure			Gain		Maximum Ratings		
Device Type	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	$V_{(BR)CEO}$	I_C mA	P_T mW
PLASTIC SOE CASE 317-01/317A-01										
MRF931	3.0	1.0	3.8	500	0.25	16#	500	5.0	5.0	50
MRF559	3.0	100	—	—	—	13.0#	512	18	150	2000
BFW92A	4.5	10	2.7	500	10	16#	500	15	35	180
MRF901	4.5	15	2.0	1000	5.0	10	1000	15	30	375
BFR96	4.5	50	2.0#	500	10	12	500	15	100	750
MRF961	4.5	50	2.0#	500	10	13.5	500	15	100	750
MRF911	5.0	30	2.5	1000	5.0	12.5#	1000	12	40	400
BFR90	5.0	14	2.4	500	2.0	18#	500	15	30	180
BFR91	5.0	30	1.9	500	2.0	16#	500	12	40	400
MRF580	5.0	75	2.0#	500	50.0	11.0	500	18	200	2500
MRF581	5.0	75	2.0#	500	50.0	13.0	500	18	200	2500
MRF536†	5.0	20	4.5#	1000	3.0	8.5	1000	10	30	300
MRF571	8.0	50	2.0	1000	5.0	10	1000	10	70	750
CERAMIC SOE CASE 244A-01, 303-01, 358-01										
2N5947	1.5	75	3.8	200	50	10	250	30	400	5000
MRF511	2.1	80	7.3	200	50	10	250	25	250	5000
2N6603	4.5	15	2.0	1000	5.0	13#	1000	15	30	400
MRF962	4.5	50	2.0#	500	10	15	500	15	100	750
2N6604	5.0	30	3.0	1000	5.0	15	1000	12	50	500
MRF587	5.5	70	3.0	500	70	11	500	17	200	5800
MRF572	8.0	50	1.0#	500	5.0	16.5#	500	10	70	750
MRF573	8.0	50	2.0	1000	5.0	10	1000	10	70	750

#Typical
†PNP



CASE 244A-01 (TO-117)

CASE 303-01 (.100" CERAMIC)

CASE 317-01 (MACRO-X)

CASE 317A-01 (MACRO-T)

CASE 358-01 (.07" CERAMIC) (MICRO-X)

SMALL-SIGNAL TRANSISTORS BY PACKAGE (continued)

Device Type	Gain — BW		Noise Figure			Gain		Maximum Ratings		
	f_T GHz	I_C mA	NF dB	f MHz	I_C mA	dB Min	f MHz	$V_{(BR)CEO}$	I_C mA	P_T mW
TO-72 METAL CAN										
2N5031	1.0	5.0	2.5	450	1.0	14	450	10	20	200
2N5032	1.0	5.0	3.0	450	1.0	14	450	10	20	200
2N4958†	1.0	2.0	3.3	450	2.0	16	450	30	30	200
2N4959†	1.0	2.0	3.8	450	2.0	15	450	30	30	200
2N5829†	1.2	2.0	2.5	450	2.0	17	450	30	30	200
2N4957†	1.2	2.0	3.0	450	2.0	17	450	30	30	200
MRF501	1.2	5.0	4.0	200	1.5	15#	200	15	50	200
MRF502	1.2	5.0	4.0	200	1.5	15#	200	15	50	200
2N6305	1.2	10	5.5	450	2.0	12	450	15	50	200
BFX89	1.2	25	6.5	500	2.0	19	200	15	50	200
BFY90	1.4	25	5.0	500	2.0	21	200	15	50	200
2N5179	1.4	10	4.5	200	1.5	15	200	12	50	200
2N6304	1.4	10	4.5	450	2.0	15	450	15	50	200
2N2857	1.6	8.0	4.1	450	1.5	12.5	450	15	40	200
MRF904	4.0	15	1.5	450	5.0	16	450	15	30	200
MRF914	4.5	20	2.0	500	5.0	15	500	12	40	200
TO-39 METAL CAN										
MM8000	0.7	50	2.7	200	10	11.4#	200	30	0.4	3.50
MM8001	0.9	50	2.7	200	10	11.4#	200	30	0.4	3.50
2N5109	1.2	50	3.0	200	10	11	216	20	400	2.50
2N5943	1.2	50	3.4	200	30	11.4#	200	30	400	3.50
MRF525*	2.5	50	4.0	400	—	13	400	35***	150	2.50
MRF517	2.7	60	7.5	300	50	10#	300	35***	150	2.50
MRF586	4.5	90	4.0	500	90	9.0	500	17	200	2.50

†PNP
*Grounded Emitter TO-39
#Typical
***$V_{(BR)CB0}$

CASE 20-03
TO-206AF
(TO-72)

CASE 79-02
TO-205AD
(TO-39)

CASE 79-03
(TO-39 CE)

Tuning, Hot Carrier, and PIN Diodes

Motorola's RF diodes are designed for electronic tuning, mixing, and switching high frequency signals. These diodes are available in the hermetic DO-7 and low cost TO-92 packages.

Tuning Diodes

The voltage variable capacitance diodes listed are designed for RF applications in all bands through UHF as well as general purpose electronic tuning and control. The product portfolio features plastic and hermetic glass packages, close tolerance units, hyper-abrupt devices, duals and AM tuning diodes.

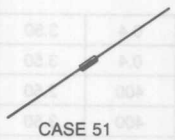
CASE 29-02
TO-226AA
(TO-92)

C_T, Nominal Capacitance pF @ V_R = 3.0 Volts		MAXIMUM WORKING VOLTAGE 32 VOLTS CASE 29-02		
Min	Max	Cap Ratio 3–30 V Min	Q @ 3.0 V 10 MHz Min	Device Type
FM RADIO AND TV HYPER-ABRUPT TUNING DIODES . . . designed for use in VHF and UHF tuners and FM radio, providing solid-state reliability in replacement of mechanical tuning methods.				
26	32	5.0	200(1)	MV209(2)
34	39	2.5	100	MV104G(3)
37	42	2.5	100	MV104(3)

CASE 182
TO-226AA
(TO-92)

		CASE 182				
		$V_{(BR)R}$ Min	Cap Ratio @ V_R Min	Volts	Q @ 1.0 V 1.0 MHz Min	Device Type
AM TUNING DIODES . . .designed for electronic tuning of AM radios, receivers and general AM frequency control.						
C_T NOMINAL CAPACITANCE pF V_R = 1.0 V f = 1.0 MHz	460	15	12	1–9	150	MVAM109
	500	12	15	1–8	150	MVAM108
		18	15	1–15	150	MVAM115
		28	15	1–25	150	MVAM125

(1) Q @ V_R = 3.0 V, f = 50 MHz
(2) Case 182 — Two-lead TO-92
(3) Monolithic Dual



CASE 51
DO-204AA
(DO-7)

		MAXIMUM WORKING VOLTAGE 60 VOLTS CASE 51						30 VOLTS		
		Cap Ratio 4–60 V Min	Q @ 4.0 V 50 MHz Min	Device Type (1)	Cap Ratio 4–60 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 2–30 V Min	Q @ 4.0 V 50 MHz Min	Device Type (2)
GENERAL-PURPOSE TUNING DIODES . . . designed for electronic tuning and control applications.										
C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	6.8	2.7	350	1N5139, A				2.7	600	1N5461A
	8.2							2.8	600	1N5462A
	10	2.8	300	1N5140, A	3.0	500	MV1866	2.8	550	1N5463A
	12	2.8	300	1N5141, A	3.0	500	MV1868	2.8	550	1N5464A
	15	2.8	250	1N5142, A	3.0	400	MV1870	2.8	550	1N5465A
	18	2.8	250	1N5143, A	3.0	400	MV1871	2.9	500	1N5466A
	20							2.9	500	1N5467A
	22	3.2	200	1N5144, A	3.2	400	MV1872	2.9	500	1N5468A
	27	3.2	200	1N5145, A	3.2	300	MV1874	2.9	500	1N5469A
	33	3.2	200	1N5146, A	3.2	300	MV1876	2.9	500	1N5470A
	39	3.2	200	1N5147, A	3.2	300	MV1877	2.9	450	1N5471A
	47	3.2	200	1N5148, A	3.2	300	MV1878	2.9	400	1N5472A
	56							2.9	300	1N5473A
	68							2.9	250	1N5474A
	82							2.9	225	1N5475A
	100							2.9	200	1N5476A

(1) Add Suffix "A" for ±5.0% C_T tolerance.
(2) Substitute "B" Suffix for ±5.0% C_T, "C" Suffix for ±2.0% C_T.

GENERAL-PURPOSE TUNING DIODES (continued)

CASE 51
DO-204AA
(DO-7)

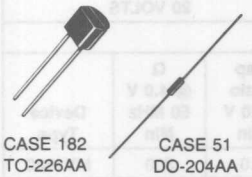
		MAXIMUM WORKING VOLTAGE								
		30 VOLTS						20 VOLTS		
		CASE 51								
		Cap Ratio 2–30 V Min	Q @ 4.0 V 50 MHz Min	Device Type (2)	Cap Ratio 4–25 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 2–20 V Min	Q @ 4.0 V 50 MHz Min	Device Type
C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	6.8	2.5	450	1N5441A				2.0	300	MV1620
	8.2	2.5	450	1N5442A				2.0	300	MV1622
	10	2.6	400	1N5443A				2.0	300	MV1624
	12	2.6	400	1N5444A				2.0	300	MV1626
	15	2.6	400	1N5445A	1.8	30	MV830	2.0	250	MV1628
	18	2.6	350	1N5446A	1.8	25	MV831	2.0	250	MV1630
	20	2.6	350	1N5447A				2.0	250	MV1632
	22	2.6	350	1N5448A	1.8	25	MV832	2.0	250	MV1634
	27	2.6	350	1N5449A	1.8	25	MV833	2.0	200	MV1636
	33	2.6	350	1N5450A	1.9	20	MV834	2.0	200	MV1638
	39	2.6	300	1N5451A	1.9	20	MV835	2.0	200	MV1640
	47	2.6	250	1N5452A	1.9	15	MV836	2.0	200	MV1642
	56	2.6	200	1N5453A	1.9	15	MV837	2.0	150	MV1644
	68	2.7	175	1N5454A	2.0	15	MV838	2.0	150	MV1646
	82	2.7	175	1N5455A	2.0	10	MV839	2.0	150	MV1648
	100	2.7	175	1N5456A	2.0	10	MV840	2.0	150	MV1650

CASE 182
TO-226AA
(TO-92)

		MAXIMUM WORKING VOLTAGE					
		30 VOLTS			25 VOLTS		
		CASE 182					
		Cap Ratio 2–30 V Min	Q @ 4.0 V 50 MHz Min	Device Type	Cap Ratio 1–10 V Min	Q @ 4.0 V 50 MHz Min	Device Type (1)
C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	6.8	2.5	450	MV2101	1.9	300	MV2201
	8.2	2.5	450	MV2102			
	10	2.5	400	MV2103	2.0	200	MV2203
	12	2.5	400	MV2104			
	15	2.5	400	MC2105	2.0	200	MV2205
	18	2.5	350	MV2106			
	22	2.5	350	MV2107	2.0	150	MV2207
	27	2.5	300	MV2108			
	33	2.5	200	MV2109	2.0	150	MV2209
	39	2.5	150	MV2110			
	47	2.5	150	MV2111	2.0	100	MV2211
	56	2.6	150	MV2112			
	68	2.6	150	MV2113	2.0	100	MV2213
	82	2.6	100	MV2114			
	100	2.6	100	MV2115	2.0	50	MV2215

(1) Add Suffix "A" for ±5.0% C_T tolerance.
(2) Substitute "B" Suffix for ±5.0% C_T, "C" Suffix for ±2.0% C_T.

GENERAL-PURPOSE TUNING DIODES (continued)



CASE 182
TO-226AA
(TO-92)

CASE 51
DO-204AA
(DO-7)

		MAXIMUM WORKING VOLTAGE					
		20 VOLTS			12 VOLTS		
		CASE 182			CASE 51		
		Cap Ratio 2–20 V Min	Q @ 4.0 V 20 MHz Min	Device Type	Cap Ratio 2–10 V Min	Q @ 2.0 V 1.0 MHz Min	Device Type
HIGH-CAPACITANCE TUNING DIODES . . . for tuning applications in lower RF frequencies.							
C_T NOMINAL CAPACITANCE pF ±10% @ V_R = 4.0 V f = 1.0 MHz	120	2.3	250	MV2301	10	200	MV1404, H**(2)
	150	2.3	250	MV2302	10	200	MV1403, H**(2)
	180	2.3	200	MV2303			
	200	2.3	200	MV2304			
	220	2.3	150	MV2305			
	250	2.3	150	MV2306	10	200	MV1405, H**(2)
	270	2.3	100	MV2307			
	330	2.3	100	MV2308			

(1) C_T tolerance is ±20%.
(2) V_R = 2.0 V
**100% processing on "H" devices.

100% Processing For High Reliability

Available on all DO-204AA (DO-7) Case 51 .

Internal Visual Inspection
per 12M53957B

High Temperature Storage
T_A = 200°C, t≥48 hours

Thermal Shock (Temperature Cycling)
MIL-STD-202, Method 107, Condition C
except 10 cycles continuously performed
t(extremes) = 15 minutes

Constant Acceleration
MIL-STD-750, Method 2006
20,000 G's

Hermetic Seal
MIL-STD-750, Method 1071
Fine Leak - Condition G
Gross Leak - Condition C, Step 1

Electrical Test

High Temperature Reverse Bias
T_A = 120°C ± 5°C, 6≥96 hours
V_R = approximately 80% of MWV
Lower temperature till T_A = 30 ± 5°C
Maintain this temperature prior to removal of Reverse Bias Voltage.
Perform Limit 2 Electrical Test within 24 hours following bias removal.

Electrical Test
I_R and C_T

Hot-Carrier Diodes

Hot-Carrier diodes are ideal for VHF and UHF mixer and detector applications as well as many higher frequency applications. They provide stable electrical characteristics by eliminating the point-contact diode presently used in many applications.

$V_{(BR)R}$ I_R = 10 μA Volts Min	C_T f = 1.0 MHz pF Max	@ V_R Volts	V_F I_F = 10 mA Volts Max	I_R nA Max	@ V_R Volts	NF f = 1.0 GHz dB Max	Device Type	Case
4.0	10	0	0.6	250	3.0	7.0	MBD101	182
20	1.5	15	0.6	200	15	—	MBD201	182
30	1.5	15	0.6	200	25	—	MBD301	182
50	1.0	20	1.2	200	25	—	MBD501	182
70	1.0	20	1.2	200	35	—	MBD701	182

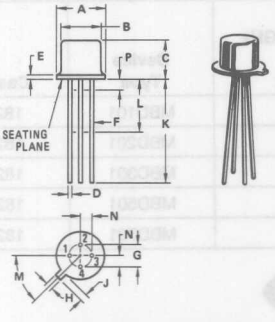
PIN Switching Diodes

. . . designed for VHF band switching and general-purpose switching.

CASE 182
TO-226AA
(TO-92)

$V_{(BR)R}$ I_R = 10 μAdc Volts Min	R_S I_F = 10 mAdc f = 10 MHz Ohms Max	C_T f = 1.0 MHz pF Max	L_S f = 250 MHz nH Typ	C_C f = 1.0 MHz pF Typ	Device Type	Case
20	0.85	2.0@15 V	6.0	0.18	MPN3404	182
200	1.0	1.0@20 V	6.0	0.18	MPN3700	182

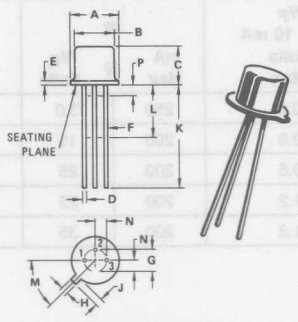
Package Dimensions



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.41	0.53	0.016	0.021
E	–	0.76	–	0.030
F	0.41	0.48	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.91	1.17	0.036	0.046
J	0.71	1.22	0.028	0.048
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	–	1.27	–	0.050

ALL JEDEC dimensions and notes apply

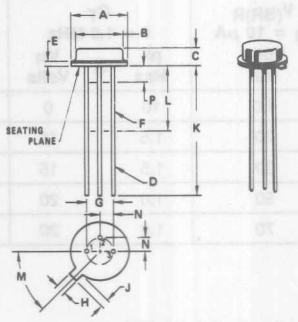
CASE 20-03
TO-206AF
(TO-72)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	4.32	5.33	0.170	0.210
D	0.406	0.533	0.016	0.021
E	–	0.762	–	0.030
F	0.406	0.483	0.016	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	–	1.27	–	0.050

All JEDEC notes and dimensions apply.

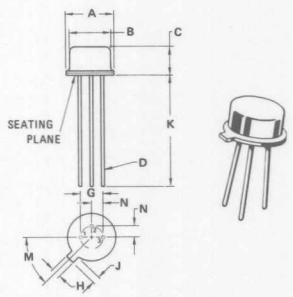
CASE 22-03
TO-206AA
(TO-18)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.31	5.84	0.209	0.230
B	4.52	4.95	0.178	0.195
C	1.65	2.16	0.065	0.085
D	0.406	0.533	0.016	0.021
E	–	1.02	–	0.040
F	0.305	0.483	0.012	0.019
G	2.54 BSC		0.100 BSC	
H	0.914	1.17	0.036	0.046
J	0.711	1.22	0.028	0.048
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45° BSC		45° BSC	
N	1.27 BSC		0.050 BSC	
P	–	1.27	–	0.050

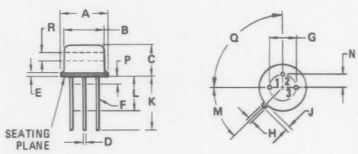
All JEDEC dimensions and notes apply

CASE 26-03
TO-206AB
(TO-46)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.51	9.40	0.335	0.370
B	7.75	8.51	0.305	0.335
C	3.81	4.57	0.150	0.180
D	0.41	0.48	0.016	0.019
G	5.08 BSC		0.200 BSC	
H	0.71	0.86	0.028	0.034
J	0.74	1.14	0.029	0.045
K	12.70	–	0.500	–
M	45° BSC		45° BSC	
N	2.54 BSC		0.100 BSC	

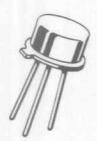
CASE 31A-01



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	8.89	9.40	0.350	0.370
B	8.00	8.51	0.315	0.335
C	6.10	6.60	0.240	0.260
D	0.406	0.533	0.016	0.021
E	0.229	3.18	0.009	0.125
F	0.406	0.483	0.016	0.019
G	4.83	5.33	0.190	0.210
H	0.711	0.864	0.028	0.034
J	0.737	1.02	0.029	0.040
K	12.70	–	0.500	–
L	6.35	–	0.250	–
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
Q	90° NOM		90° NOM	
R	2.54	–	0.100	–

All JEDEC dimensions and notes apply.

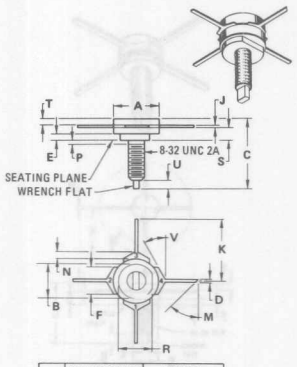
CASE 79-02
TO-205AD
(TO-39)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.02	9.30	0.355	0.366
B	8.00	8.51	0.315	0.335
C	4.19	4.57	0.165	0.180
D	0.43	0.53	0.017	0.021
E	0.43	0.89	0.017	0.035
F	0.41	0.48	0.016	0.019
G	4.83	5.33	0.190	0.210
H	0.71	0.86	0.028	0.034
J	0.74	1.02	0.029	0.040
K	12.70	–	0.500	–
M	45° NOM		45° NOM	
N	2.54 TYP		0.100 TYP	
Q	90° NOM		90° NOM	

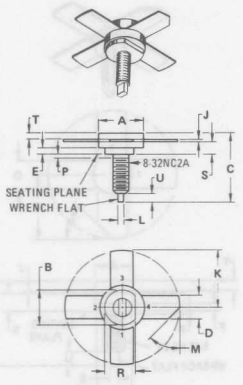
CASE 79-03
(TO-39 CE)

PACKAGE DIMENSIONS (continued)



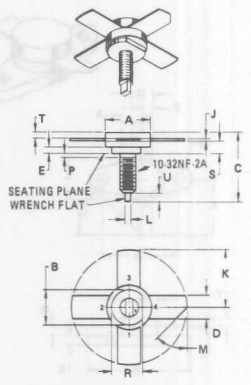
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	0.64	0.89	0.025	0.035
E	1.78	–	0.070	–
F	5.46	5.97	0.215	0.235
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
M	45° NOM		45° NOM	
N	1.27	1.52	0.050	0.060
P	–	1.27	–	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132
V	10°	20°	10°	20°

CASE 144B-05
(.380″ STUD)



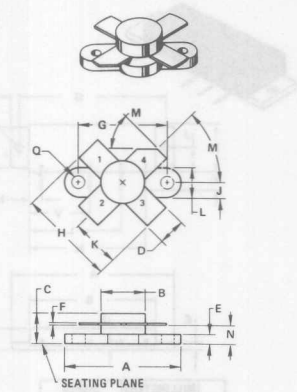
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	9.40	9.78	0.370	0.385
B	8.13	8.38	0.320	0.330
C	17.02	20.07	0.670	0.790
D	5.46	5.97	0.215	0.235
E	1.78	–	0.070	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.40	1.78	0.055	0.070
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	7.59	7.80	0.299	0.307
S	4.01	4.52	0.158	0.178
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-09
(.380″ STUD)



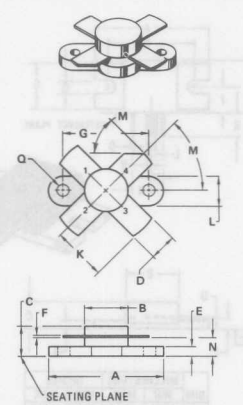
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	12.45	12.95	0.490	0.510
B	10.54	10.80	0.415	0.425
C	19.68	22.73	0.775	0.895
D	5.46	5.97	0.215	0.235
E	1.83	–	0.072	–
J	0.08	0.18	0.003	0.007
K	12.45	–	0.490	–
L	1.65	1.90	0.065	0.075
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
R	9.73	10.06	0.383	0.396
S	3.84	4.50	0.151	0.177
T	2.11	2.54	0.083	0.100
U	2.49	3.35	0.098	0.132

CASE 145A-10
(.500″ STUD)



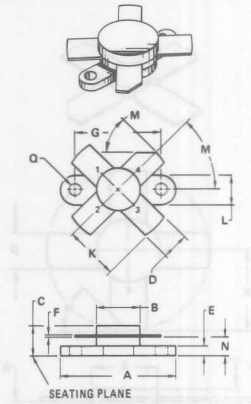
DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	9.40	9.91	0.370	0.390
C	5.82	7.14	0.229	0.281
D	5.46	5.97	0.215	0.235
E	2.18	2.67	0.085	0.105
F	0.10	0.15	0.004	0.006
G	18.29	18.54	0.720	0.730
H	20.07	20.57	0.790	0.810
K	10.03	10.29	0.395	0.405
L	6.22	6.48	0.245	0.255
M	40°	50°	40°	50°
N	3.81	4.57	0.150	0.180
Q	2.87	3.30	0.113	0.130

CASE 211-07
(.380″ FLANGE)



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	9.40	9.91	0.370	0.390
C	5.82	7.14	0.229	0.281
D	5.46	5.97	0.215	0.235
E	2.29	2.79	0.090	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.245	0.255
M	45° NOM		45° NOM	
N	3.81	4.57	0.150	0.180
Q	2.87	3.30	0.113	0.130

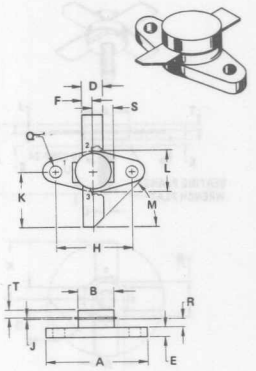
CASE 211-09
(.380″ FLANGE)



DIM	MILLIMETERS MIN	MAX	INCHES MIN	MAX
A	24.38	25.15	0.960	0.990
B	11.81	12.95	0.465	0.510
C	5.82	6.98	0.229	0.275
D	5.46	5.97	0.216	0.235
E	2.13	2.79	0.084	0.110
F	0.08	0.18	0.003	0.007
G	18.29	18.54	0.720	0.730
K	11.05	–	0.435	–
L	6.22	6.48	0.246	0.255
M	45° NOM		45° NOM	
N	3.66	4.52	0.144	0.178
Q	2.92	3.30	0.115	0.130

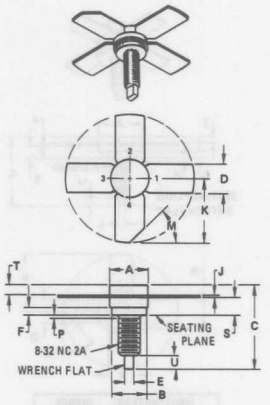
CASE 211-11
(.500″ FLANGE)

PACKAGE DIMENSIONS (continued)



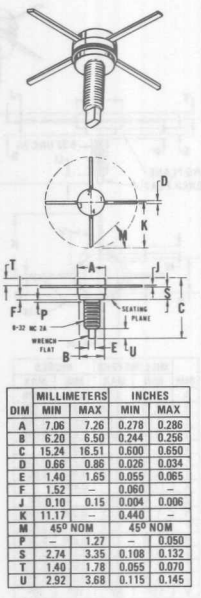
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	21.08	21.59	0.830	0.850
B	9.27	9.78	0.365	0.385
D	5.59	5.84	0.220	0.230
E	2.03	2.41	0.080	0.095
F	2.79	2.92	0.110	0.115
H	15.11	15.37	0.595	0.605
J	0.10	0.15	0.004	0.006
K	11.43	–	0.450	–
L	9.91	10.41	0.390	0.410
M	45°	NOM	45°	NOM
Q	2.92	3.18	0.115	0.125
R	1.52	2.03	0.060	0.080
S	–	5.38	–	0.212
T	2.03	2.54	0.080	0.100

CASE 215-02



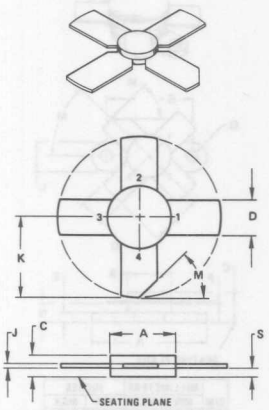
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.97	0.215	0.235
E	1.40	1.65	0.055	0.065
F	1.52	–	0.060	–
J	0.08	0.18	0.003	0.007
K	11.05	–	0.435	–
M	45°	NOM	45°	NOM
P	–	1.27	–	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.78	0.055	0.070
U	2.92	3.68	0.115	0.145

CASE 244-04
(.280" STUD)



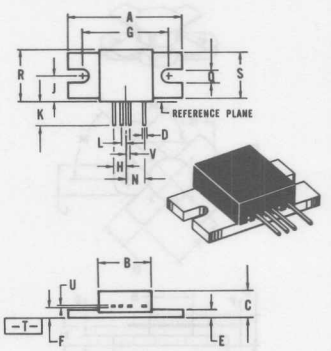
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	15.24	16.51	0.600	0.650
D	0.66	0.86	0.026	0.034
E	1.40	1.65	0.055	0.065
F	1.52	–	0.060	–
J	0.10	0.15	0.004	0.006
K	11.17	–	0.440	–
M	45°	NOM	45°	NOM
P	–	1.27	–	0.050
S	2.74	3.35	0.108	0.132
T	1.40	1.78	0.055	0.070
U	2.92	3.68	0.115	0.145

CASE 244A-01
(TO-117)



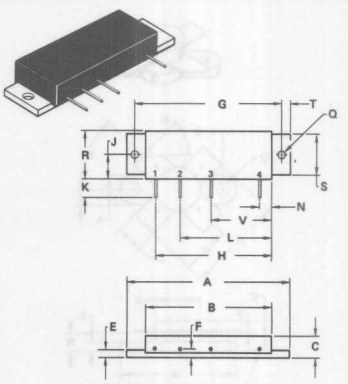
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
C	2.84	3.45	0.112	0.136
D	5.46	5.97	0.215	0.235
J	0.08	0.18	0.003	0.007
K	11.05	–	0.435	–
M	45°	NOM	45°	NOM
S	1.40	1.65	0.055	0.065

CASE 249-05
(.280" PILL)



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	37.85	38.35	1.490	1.510
B	17.78	18.29	0.700	0.720
C	8.38	9.02	0.330	0.380
D	0.35	0.05	0.014	0.026
E	2.54	2.92	0.100	0.140
F	3.18	3.94	0.125	0.180
G	29.72 BSC		1.170 BSC	
H	3.81 BSC		0.150 BSC	
J	9.24 BSC		0.364 BSC	
K	2.54	–	0.100	–
L	1.27 BSC		0.050 BSC	
N	6.35 BSC		0.250 BSC	
Q	3.81	4.06	0.150	0.160
R	17.40	19.55	0.685	0.770
S	15.11	15.82	0.595	0.815
U	0.20	0.30	0.008	0.012
V	1.27 BSC		0.050 BSC	

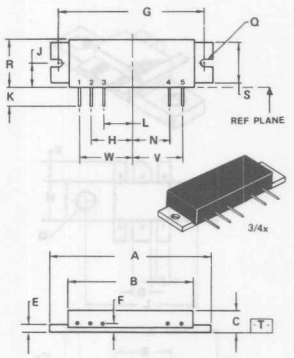
CASE 297A-05



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	48.13	48.39	1.895	1.905
B	33.15	33.40	1.305	1.315
C	5.84	6.86	0.230	0.270
E	1.32	1.83	0.052	0.072
F	2.21	2.84	0.087	0.112
G	41.15	41.40	1.620	1.630
H	30.35	30.61	1.195	1.205
J	7.49	7.75	0.295	0.305
K	5.84	7.62	0.230	0.300
L	22.73	22.98	0.895	0.905
N	2.41	2.67	0.095	0.105
Q	2.92	3.18	0.115	0.125
R	17.14	17.40	0.675	0.685
S	15.11	15.37	0.595	0.605
T	3.35	3.61	0.132	0.142
V	15.11	15.37	0.595	0.605

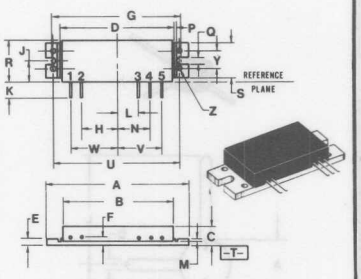
CASE 301-01

PACKAGE DIMENSIONS (continued)



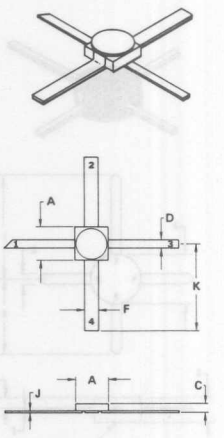
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	55.63	56.13	2.190	2.210
B	35.43	35.94	1.395	1.415
C	9.02	9.65	0.355	0.380
E	3.18	3.53	0.125	0.139
F	3.91	4.44	0.154	0.175
G	48.26 BSC		1.900 BSC	
H	10.16 BSC		0.400 BSC	
J	8.76	9.77	0.345	0.385
K	5.72	–	0.225	–
L	7.62 BSC		0.300 BSC	
N	10.16 BSC		0.400 BSC	
P	3.76	3.88	0.148	0.153
Q	3.81	4.06	0.150	0.160
R	17.53	19.55	0.690	0.770
S	15.11	15.49	0.595	0.610
V	15.24 BSC		0.600 BSC	
W	12.70 BSC		0.500 BSC	

CASE 301B-03



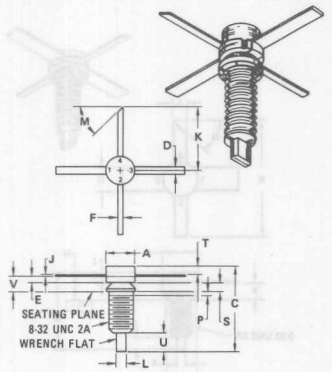
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	48.00	48.51	1.890	1.910
B	29.71	30.22	1.170	1.190
C	9.01	9.65	0.355	0.380
D	30.60	31.11	1.205	1.225
E	3.17	3.53	0.125	0.139
F	1.37	4.44	0.154	0.175
G	40.64 BSC		1.600 BSC	
H	8.89 BSC		0.350 BSC	
J	8.76	9.77	0.345	0.385
K	5.71	–	0.225	–
L	3.81 BSC		0.150 BSC	
M	–	0.50	–	0.020
N	6.35 BSC		0.250 BSC	
P	–	0.50	–	0.020
Q	3.81	4.06	0.150	0.160
R	17.39	19.55	0.685	0.770
S	15.11	15.49	0.595	0.610
U	34.79 BSC		1.370 BSC	
V	11.43 BSC		0.450 BSC	
W	11.43 BSC		0.450 BSC	
Y	11.17 BSC		0.440 BSC	
Z	1.70	1.85	0.067	0.073

CASE 301C-02



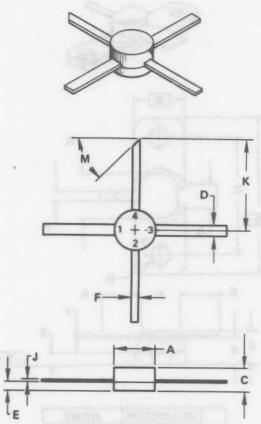
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	2.29	2.67	0.090	0.105
C	0.89	1.40	0.035	0.055
D	0.41	0.61	0.016	0.024
F	0.89	1.09	0.035	0.043
J	0.08	0.15	0.003	0.006
K	4.45	5.84	0.175	0.230

CASE 303-01
(.100" CERAMIC)



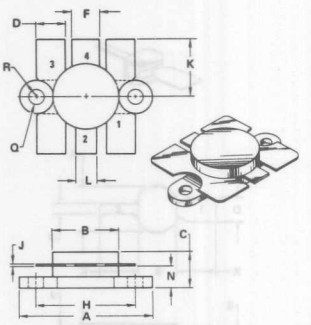
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.08	5.59	0.200	0.220
C	13.97	16.26	0.550	0.640
D	1.40	1.65	0.055	0.065
E	1.02	1.27	0.040	0.050
F	0.64	0.89	0.025	0.035
J	0.08	0.18	0.003	0.007
K	11.05	–	0.435	–
L	1.40	1.65	0.055	0.065
M	45° NOM		45° NOM	
P	–	1.27	–	0.050
S	1.40	1.65	0.055	0.065
T	1.40	1.78	0.055	0.070
U	2.79	3.81	0.110	0.150
V	2.41	2.92	0.095	0.115

CASE 305-01
(.204" STUD)



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.08	5.59	0.200	0.220
C	2.41	3.30	0.095	0.130
D	1.40	1.65	0.055	0.065
E	1.02	1.27	0.040	0.050
F	0.64	0.89	0.025	0.035
J	0.08	0.18	0.003	0.007
K	11.05	–	0.435	–
M	45° NOM		45° NOM	

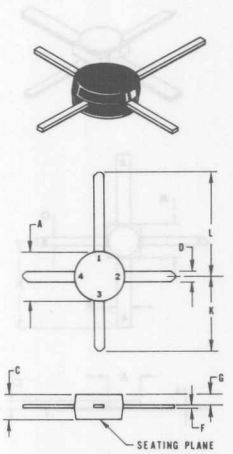
CASE 305A-01
(.204" PILL)



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.38	25.15	0.960	0.990
B	12.45	12.95	0.490	0.510
C	5.97	7.62	0.235	0.300
D	5.33	5.59	0.210	0.220
F	5.08	5.33	0.200	0.210
H	18.29	18.54	0.720	0.730
J	0.10	0.15	0.004	0.008
K	10.29	11.18	0.405	0.440
L	3.81	4.06	0.150	0.160
N	3.81	4.32	0.150	0.170
Q	2.92	3.30	0.115	0.130
R	3.05	3.30	0.120	0.130

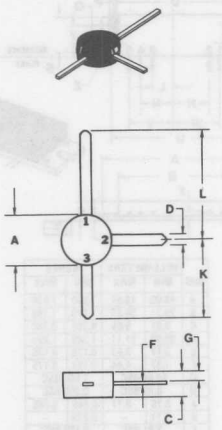
CASE 316-01

PACKAGE DIMENSIONS (continued)



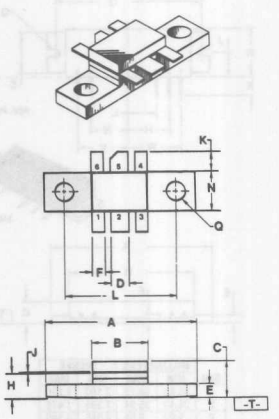
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.44	5.21	0.175	0.205
C	1.90	2.54	0.075	0.100
D	0.84	0.99	0.033	0.039
F	0.20	0.30	0.008	0.012
G	0.76	1.14	0.030	0.045
K	7.24	8.13	0.285	0.320
L	10.54	11.43	0.415	0.450

CASE 317-01
(MACRO-X)



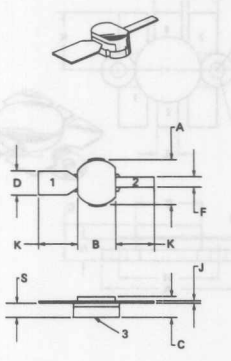
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	4.44	5.21	0.175	0.205
C	1.90	2.54	0.075	0.100
D	0.94	0.99	0.033	0.039
F	0.20	0.30	0.008	0.012
G	0.76	1.14	0.030	0.045
K	7.24	8.13	0.285	0.320
L	10.54	11.43	0.415	0.450

CASE 317A-01
(MACRO-T)



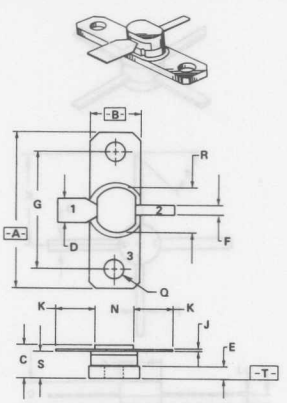
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.51	25.02	0.965	0.985
B	9.02	9.52	0.355	0.375
C	5.84	6.60	0.230	0.260
D	2.92	3.18	0.115	0.125
E	2.69	2.95	0.106	0.116
F	1.91	2.16	0.075	0.085
H	4.06	4.31	0.160	0.170
J	0.10	0.15	0.004	0.006
K	2.29	2.79	0.090	0.110
L	18.42 BSC		0.725 BSC	
N	5.72	6.12	0.225	0.241
Q	3.18	3.43	0.125	0.135

CASE 319-04



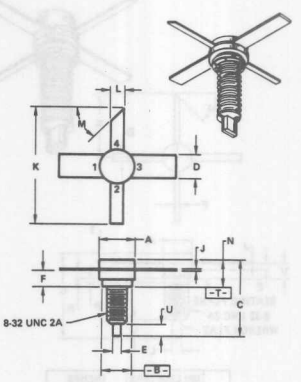
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	5.72	5.97	0.225	0.235
B	4.44	4.70	0.175	0.185
C	2.29	2.74	0.090	0.108
D	2.92	3.18	0.115	0.125
F	1.14	1.40	0.045	0.055
J	0.08	0.15	0.003	0.006
K	–	9.52	–	0.375
S	1.52	1.78	0.060	0.070

CASE 328-02



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	20.19	20.57	0.795	0.810
B	6.22	6.48	0.245	0.255
C	3.68	4.19	0.145	0.165
D	2.92	3.18	0.115	0.125
E	1.40	1.65	0.055	0.065
F	1.14	1.40	0.045	0.055
G	14.22 BSC		0.560 BSC	
J	0.08	0.15	0.003	0.006
K	–	9.52	–	0.375
N	4.44	4.70	0.175	0.185
Q	3.25	3.35	0.128	0.132
R	5.72	5.97	0.225	0.235
S	2.92	3.43	0.115	0.135

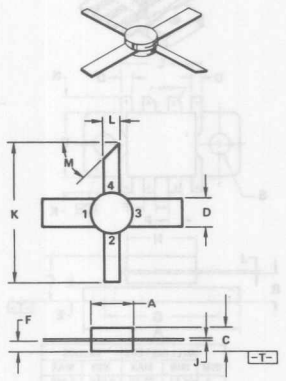
CASE 328A-01



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	10.01	0.370	0.394
B	8.00	8.51	0.315	0.335
C	16.51	17.91	0.650	0.705
D	5.97	6.22	0.235	0.245
E	1.40	1.65	0.055	0.065
F	3.81	4.32	0.150	0.170
J	0.08	0.18	0.003	0.007
K	15.24	–	0.600	–
L	2.41	2.67	0.095	0.105
M	45° Nom		45° Nom	
N	4.57	6.22	0.180	0.245
U	2.67	3.18	0.105	0.125

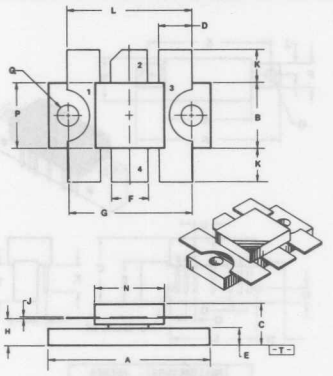
CASE 332-02
(.380" STUD)

PACKAGE DIMENSIONS (continued)



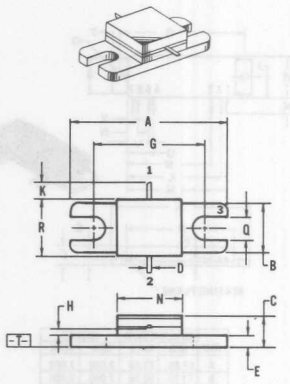
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	9.40	10.01	0.370	0.394
C	3.30	3.81	0.130	0.150
D	5.97	6.22	0.235	0.245
F	1.40	1.78	0.055	0.070
J	0.08	0.18	0.003	0.007
K	15.24	–	0.600	–
L	2.41	2.67	0.095	0.105
M	45° NOM		45° NOM	

CASE 332A-01
(.380" STUD)



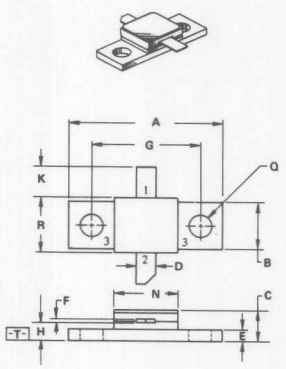
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.51	25.02	0.965	0.985
B	9.91	10.41	0.390	0.410
C	6.73	7.24	0.265	0.285
D	4.83	5.33	0.190	0.210
E	2.42	2.92	0.095	0.115
F	5.47	5.96	0.215	0.235
G	18.42 BSC		0.725 BSC	
H	3.94	4.44	0.155	0.175
J	0.10	0.15	0.004	0.006
K	4.95	5.21	0.195	0.205
L	18.80	19.55	0.740	0.770
N	10.54	10.80	0.415	0.425
P	9.91	10.16	0.390	0.400
Q	3.05	3.42	0.120	0.135

CASE 333-03



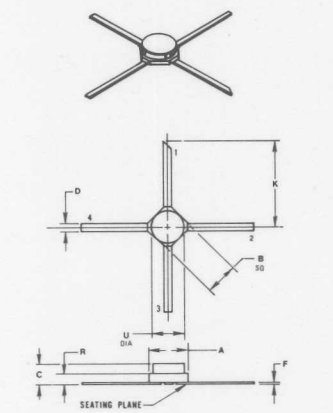
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	22.61	23.11	0.890	0.910
B	9.65	9.91	0.380	0.390
C	4.06	5.84	0.160	0.230
D	0.51	0.76	0.020	0.030
E	1.40	1.65	0.055	0.065
G	16.51 BSC		0.650 BSC	
H	1.14	1.77	0.045	0.070
K	2.54	–	0.100	–
N	9.91	10.41	0.390	0.410
Q	3.00	3.61	0.118	0.142
R	9.91	10.41	0.390	0.410

CASE 336-03



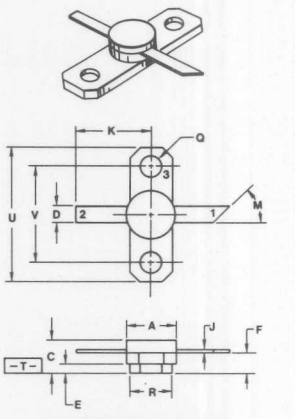
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	20.07	20.57	0.790	0.810
B	6.48	6.73	0.255	0.265
C	3.68	4.06	0.145	0.160
D	2.29	2.79	0.090	0.110
E	1.42	1.73	0.056	0.068
F	0.05	0.15	0.002	0.006
G	14.27 BSC		0.560 BSC	
H	2.29	2.79	0.090	0.110
K	3.43	4.19	0.135	0.165
N	7.87	8.38	0.310	0.330
Q	3.05	3.30	0.120	0.130
R	7.24	7.49	0.285	0.295

CASE 337-02



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	2.41	2.92	0.095	0.115
B	1.95	2.36	0.077	0.093
C	1.09	1.60	0.043	0.063
D	0.43	0.58	0.017	0.023
F	0.07	0.15	0.003	0.006
K	4.82	6.60	0.190	0.260
R	0.53	0.96	0.021	0.038
U	1.98	2.18	0.078	0.086

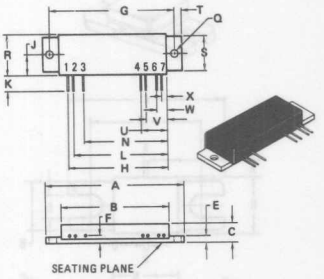
CASE 358-01
(MICRO-X)



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	7.06	7.26	0.278	0.286
C	4.44	5.20	0.175	0.205
D	2.36	2.71	0.093	0.107
E	1.39	1.77	0.055	0.070
F	2.66	3.42	0.105	0.135
J	0.10	0.15	0.004	0.006
K	11.04	–	0.435	–
M	45° NOM		45° NOM	
Q	3.04	34.2	0.120	0.135
R	6.09	6.66	0.240	0.260
U	20.06	20.57	0.790	0.810
V	14.27 BSC		0.562 BSC	

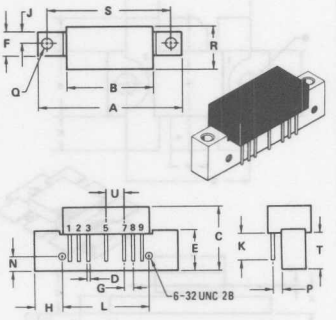
CASE 361A-01

PACKAGE DIMENSIONS (continued)



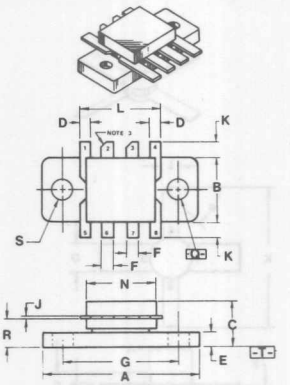
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	67.06	67.56	2.640	2.660
B	51.82	52.96	2.040	2.085
C	8.51	9.14	0.335	0.360
E	2.54	2.92	0.100	0.115
F	2.67	2.92	0.105	0.115
G	61.09 BSC		2.405 BSC	
H	47.88	48.64	1.885	1.915
J	10.16	11.18	0.400	0.440
K	5.84	7.62	0.230	0.300
L	45.34	46.10	1.785	1.815
N	40.26	41.02	1.585	1.615
Q	3.45	3.71	0.136	0.146
R	20.32	20.83	0.800	0.820
S	17.02	17.53	0.670	0.690
T	2.98	3.24	0.1175	0.1275
U	12.32	13.08	0.485	0.515
V	9.78	10.54	0.385	0.415
W	4.70	5.46	0.185	0.215
X	2.16	2.92	0.085	0.115

CASE 700-03



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	–	45.08	–	1.775
B	26.42	26.92	1.040	1.060
C	20.57	21.34	0.810	0.840
D	0.46	0.56	0.018	0.022
E	11.81	12.95	0.465	0.510
F	7.62	8.13	0.300	0.320
G	2.41	2.67	0.095	0.105
H	9.65	9.78	0.380	0.385
J	3.96 BSC		0.156 BSC	
K	6.86	7.37	0.270	0.290
L	25.40 BSC		1.000 BSC	
N	4.06	4.32	0.160	0.170
P	2.16	2.92	0.085	0.115
Q	3.76	4.27	0.148	0.168
R	–	15.11	–	0.595
S	38.10 BSC		1.500 BSC	
T	11.05	11.43	0.435	0.450
U	4.95	5.21	0.195	0.205

CASE 714-02



DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	24.51	25.15	0.965	0.985
B	9.91	10.41	0.390	0.410
C	6.22	7.24	0.245	0.285
D	1.65	1.90	0.065	0.075
E	2.16	2.41	0.085	0.095
F	1.91	2.16	0.075	0.085
G	18.42 BSC		0.725 BSC	
H	–	–	–	–
J	0.08	0.18	0.003	0.007
K	2.29	2.79	0.090	0.110
L	12.55	12.85	0.494	0.506
N	9.91	10.42	0.415	0.435
P	–	–	–	–
Q	3.18	3.43	0.125	0.135
R	3.94	4.45	0.155	0.175
S	3.18	3.43	0.125	0.135

CASE 744-02