PRODUCT CATALOG

DECEMBER 2023

NOW INCLUDING
WAVEGUIDE

RF, Microwave & mmWave Components
Bare Die, Surface Mount, Connectorized & Waveguide
DC to Sub-THz

The Trusted Leader When Performance Matters

Marki® microwave

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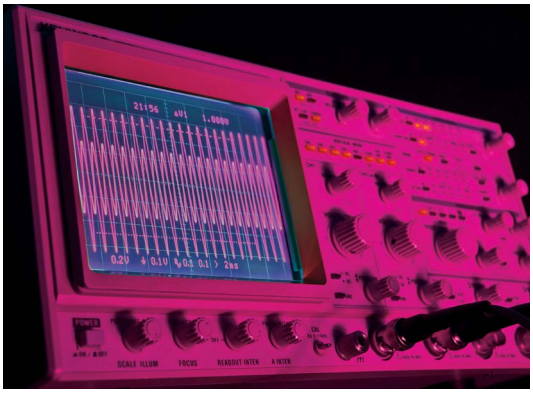
At Marki Microwave, we empower our customers to design faster, simplify production, eliminate complexity, and shatter performance barriers. We achieve this through intensive research, rigorous product development, and advanced, carefully controlled production.

PERFORMANCE

By combining time-honored fabrication and assembly techniques with a modern design approach, we can push the technological boundaries of broadband RF and microwave components like never before. With proprietary innovations such as our T3 Mixer® line and high isolation bridge power combiners, and an expanding portfolio of MMIC devices, we seek to provide the most comprehensive selection of high performance microwave components in the world.

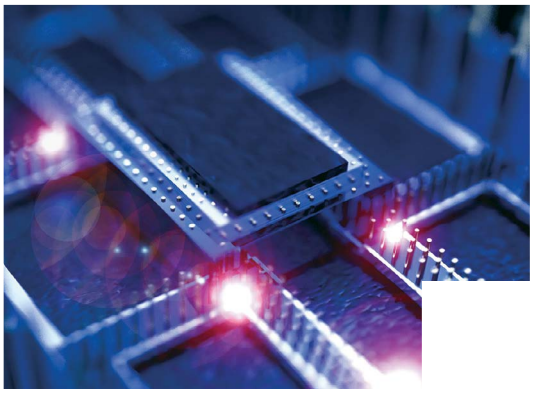
HIGH FREQUENCY OPERATION

As applications become more complex, data and bandwidth requirements continue to increase. This necessitates a move to higher and higher frequencies to take advantage of available spectrum. At Marki Microwave, we focus on designs and packaging that allow for broadband operation at millimeter wave frequencies, delivering repeatable and consistent performance from simulation to operation. Marki Microwave continues to push the high frequency envelope, allowing our customers to develop superior solutions at an expedited rate.



PACKAGING

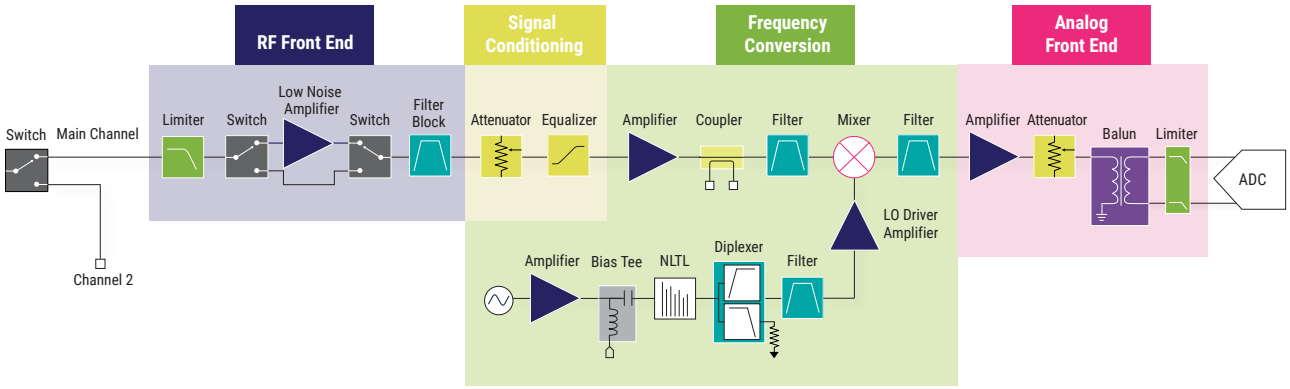
As functions become more complex it is necessary to consider how the role of packaging can affect the design-in-process. We simplify product designs with easy-to-use packages that allow the MMIC design to be realized in both surface mount and connectorized forms, as well as solutions that combine multiple functions into one package. By co-designing the die and package, Marki Microwave ensures optimal performance at the board level. From our chip scale packaging (CSP) that delivers up to 90 GHz in a surface mount footprint to the flexible, multi-octave M-Package designs that enable DC to 120 GHz in a connectorized form, Marki Microwave continues to lead in packaging innovation.



THE TRUSTED LEADER WHEN PERFORMANCE MATTERS

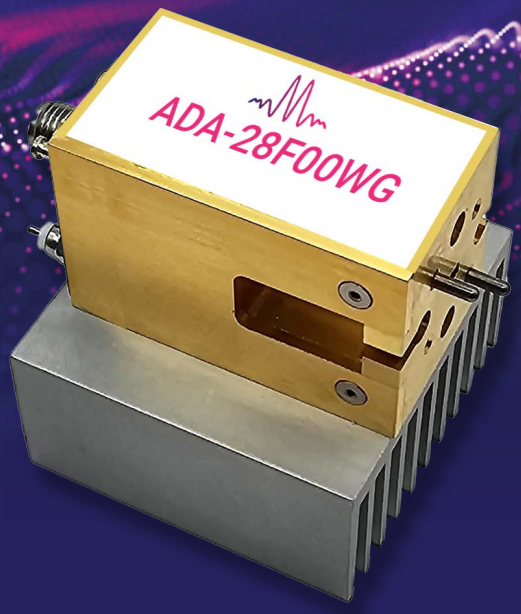
For over 30 years, we've solved the industry's toughest technical problems by creating a robust portfolio of performance shattering RF and microwave products. Founded in 1991 with the goal of developing the best mixers in the industry, today Marki Microwave is a single source for high performance, broadband microwave technology, supporting multiple form factors including die, surface mount, and connectorized solutions for the entire RF block diagram.

Inventing leading-edge products and focusing on key technical challenges facing the evolving RF and microwave industry have been the cornerstones of our success. From simulation and design to packaging, innovation and creativity are part of our DNA, propelling us forward as we continue to challenge the status quo.

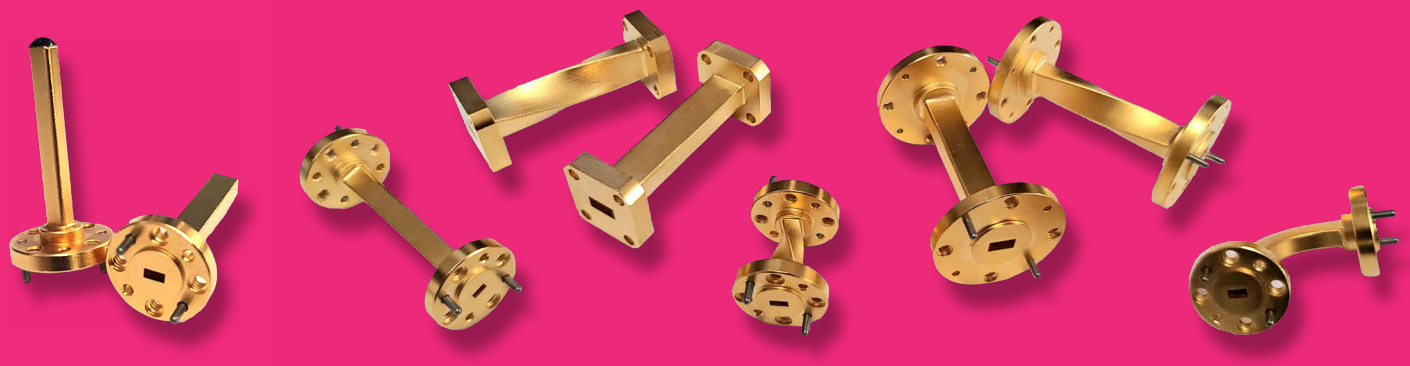


As demands from RF and microwave markets continue to evolve and the supply base consolidates, Marki Microwave remains dedicated to creating a future of limitless possibilities, expanding our catalog and empowering the industry to develop next-generation systems.

NEW
WAVEGUIDE PRODUCTS



PRECISION
MILLIMETERWAVE
NOW A MARKI MICROWAVE BUSINESS



MARKI MICROWAVE

is pleased to announce it has expanded its product portfolio by acquiring the waveguide business of Precision Millimeter Wave.

The acquisition extends Marki Microwave's capabilities into the sub-THz frequency range, allowing the company to innovate and create truly differentiated products that combine waveguide and traditional board-level connection methods.

Marki Microwave can now support RF to mmWave and frequencies from DC to sub-THz for upcoming test and measurement, aerospace and defense, point-to-point communications and space applications, as well as emerging communication platforms such as 6G as it extends into D band.

Current offerings include over 100 standard commercial waveguide products and multiple custom waveguide products spanning mmWave to over 200 GHz.

Products for mmWave to Sub-THz Frequencies

Fixed Attenuators	Multipliers	Power Dividers	Full Band Isolators
Detectors	H-Bend Waveguides	E-Bend Waveguides	Waveguide Twists
Waveguide Straights	Adjustable Attenuators	Terminations	Standard Gain Horns
Couplers	Amplifiers	Switches	Mixers

To cross-reference Precision Millimeter Wave part numbers with Marki Microwave part numbers, please visit www.markimicrowave.com. For questions and new product inquiries, contact sales@markimicrowave.com.

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BARE DIE

AMPLIFIERS, LO Driver

Part Number	Band (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA)	ECCN
ADM-5931CH	DC-28	11	+18	+27	+3 to +7 VD and -0.3 to 0 VG	85	EAR99
ADM-5974CH	DC-35	14	+22	+27	+3 to +7 VD and -0.3 to 0 VG	160	3A001.b.2.d
APM-7099CH[1]	0.01-20	14	+25	+24	+5 to +8 VC and +5 to +8 VB	72	EAR99
APM-7098CH[1]	0.1-22	14	+23	+24	+5 to +8 VC and +5 to +8 VB	44	EAR99
APM-6849CH[1]	2-30	11	+21	+21	+5 VC and +5 VB	23	EAR99
AMM-7199CH	11-38	20.5	+21	+31	+3 to +4 VD and -0.6 to -0.4 VG	180	3A001.b.2.d
AMM-7200CH	12-46	18	+21.5	+29	+3 to +4 VD and -0.6 to -0.4 VG	180	3A001.b.2.d
AMM-6702CH	20-55	24	+21	+27	+3 to +4 VD and -0.6 to -0.4 VG	200	3A001.b.2.d
AMM-7203CH	30-60	11.5	+16	+21	+1.5 to +3 VD and -0.6 to -0.4 VG	80	3A001.b.2.d

[1]Low Phase Noise

AMPLIFIERS, Gain Block & Low Noise

Part Number	Band (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA)	ECCN
AKA-1300D	DC-14	13	5	+14	+28	+3.8 VD	50	EAR99
AKA-1310D	DC-14	13	5	+14	+28	+4.6 VD	50	EAR99
AKA-1400D	DC-14	17	4	+15	+28	+3.8 VD	50	EAR99
AKA-1500D	DC-14	19	4	+16	+28	+4.2 VD	50	EAR99
ADM-8558CH	DC-20	16	1.8	+14	+23	+6 VD	50	EAR99
ADM-8556CH	6-20	24	1.3	+16	+27	+3 VD	67	EAR99

ATTENUATORS

Part Number	Band (GHz)	Attenuation (dB)	Accuracy (dB)	Return Loss (dB)	ECCN
ATN00-0067CH	DC-67	0	see datasheet	32	EAR99
ATN01-0067CH	DC-67	1	see datasheet	33	EAR99
ATN02-0067CH	DC-67	2	see datasheet	35	EAR99
ATN03-0067CH	DC-67	3	see datasheet	37	EAR99
ATN04-0067CH	DC-67	4	see datasheet	36	EAR99
ATN05-0067CH	DC-67	5	see datasheet	36	EAR99
ATN06-0067CH	DC-67	6	see datasheet	37	EAR99
ATN07-0067CH	DC-67	7	see datasheet	33	EAR99
ATN08-0067CH	DC-67	8	see datasheet	38	EAR99
ATN09-0067CH	DC-67	9	see datasheet	38	EAR99
ATN10-0067CH	DC-67	10	see datasheet	38	EAR99
ATN00-00110CH	DC-110	0	see datasheet	21	EAR99
ATN01-00110CH	DC-110	1	see datasheet	20	EAR99
ATN02-00110CH	DC-110	2	see datasheet	23	EAR99
ATN03-00110CH	DC-110	3	see datasheet	22	EAR99
ATN04-00110CH	DC-110	4	see datasheet	22	EAR99
ATN05-00110CH	DC-110	5	see datasheet	25	EAR99
ATN06-00110CH	DC-110	6	see datasheet	26	EAR99
ATN07-00110CH	DC-110	7	see datasheet	27	EAR99
ATN08-00110CH	DC-110	8	see datasheet	26	EAR99
ATN09-00110CH	DC-110	9	see datasheet	26	EAR99
ATN10-00110CH	DC-110	10	see datasheet	25	EAR99

BALUNS

Part Number	Band (GHz)	Amp Bal (dB)	Phase Bal (°)	Isolation (dB)	Impedance Ratio	Total Insertion Loss as a Mode Converter (dB)	ECCN
MBAL-1440CH	14-40	0.2	1.1	13	1:2	3	EAR99

DIPLEXERS

Part Number	Passband Low (GHz)	Passband High (GHz)	Isolation (dB)	ECCN
MDPX-0305CH	DC-3	5-26.5	40	EAR99
MDPX-0407CH	DC-4	7-26.5	38	EAR99
MDPX-0609CH	DC-6	9-26.5	51	EAR99
MDPX-2330CH	DC-23	30-60	20	EAR99
MDPX-2734CH	DC-27	34-60	20	EAR99
✦ MDPX-00002CH*	DC-35	43.3-59.9	41	EAR99
✦ MDPX-00001CH*[1]	13.2-15.4	17.4-20.3	59	EAR99

[1]Duplexer

EQUALIZERS, Positive Gain Slope

Part Number	Band (GHz)	Low Freq Attenuation (dB)	Typ Return Loss (dB)	ECCN
MEQX-7ACH	DC-7	3, 6, 10 & 12.5	29, 29, 27, 27	EAR99
MEQX-14ACH	DC-14	3, 6 & 10	23, 22, 24	EAR99
MEQX-20ACH	DC-20	3, 5, 6, 7.5, 10 & 11	21, 22, 21, 23, 25, 23	EAR99
MEQX-30ACH	DC-30	3, 6 & 10	20	EAR99
MEQX-60ACH	DC-60	3, 6 & 10	15	EAR99

FIXED FILTERS, Lowpass

Part Number	3dB Cutoff (GHz)	Passband Insertion Loss (dB)	Passband Return Loss (dB)	Stopband Frequency (GHz)	Stopband Suppression (dB)	ECCN
MFLP-00001CH	6.15	0.50	20	7.50-40.00	45	EAR99
MFLP-00002CH	9.30	0.50	24	12.00-40.00	52	EAR99
MFLP-00003CH	12.20	0.50	20	16.00-40.00	46	EAR99
MFLP-00004CH	15.20	0.50	21	20.00-40.00	44	EAR99
MFLP-00005CH	18.30	0.40	21	22.00-40.00	49	EAR99

FIXED FILTERS, Highpass

Part Number	3dB Cutoff (GHz)	Passband Insertion Loss (dB)	Passband Return Loss (dB)	Stopband Frequency (GHz)	Stopband Suppression (dB)	ECCN
MFHP-00001CH	2.00	0.40	20	DC-1.00	79	EAR99
MFHP-00002CH	10.00	0.90	13	DC-7.50	53	EAR99
MFHP-00003CH	15.50	1.30	11	DC-12.70	48	EAR99

***New Release**

All electrical specifications given are typical values.

FIXED FILTERS, Bandpass

Part Number	Center Freq (GHz)	1dBc Passband (GHz)	Insertion Loss in Passband (dB)	ECCN
MFBP-00001CH*	5.40	4.70-6.10	1.3	EAR99
MFBP-00002CH*	6.60	5.90-7.40	1.53	EAR99
MFBA-00004CH	10.00	8.40-12.50	1.9	EAR99
MFB-1100CH	11.00	9.50-12.50	2.0	EAR99
MFBA-00003CH	12.00	10.10-14.10	2.1	EAR99
MFBP-00026CH*	12.50	10.00-14.75	1.2	EAR99
MFBB-00001CH	15.10	14.60-15.65	2.57	EAR99
MFB-1600CH	16.00	12.60-18.60	1.5	EAR99
MFBA-00001CH	16.00	14.10-17.90	2.4	EAR99
MFBP-00025CH*	16.50	13.15-19.45	1.2	EAR99
MFB-2025CH	20.25	16.75-24.40	1.5	EAR99
MFBB-00002CH	21.75	20.25-23.25	1.6	EAR99
MFBP-00024CH*	22.00	18.65-25.80	1.43	EAR99
MFBA-00002CH	22.20	18.10-26.00	1.8	EAR99
MFB-2400CH	24.00	21.00-27.00	1.5	EAR99
MFB-2500CH	25.00	18.00-32.00	1.5	EAR99
MFB-2625CH	26.25	21.50-30.00	1.5	EAR99
MFBP-00023CH*	28.50	25.00-33.30	1.7	EAR99
MFB-3175CH	31.75	26.60-36.70	1.5	EAR99
MFB-3300CH	33.00	26.00-40.00	1.5	EAR99
MFB-3325CH	33.25	32.00-34.30	2.5	EAR99
MFB-3475CH	34.75	29.95-40.00	2.0	EAR99
MFB-3450CH	35.00	24.00-45.00	1.5	EAR99
MFBP-00022CH*	36.00	31.00-41.20	1.7	EAR99
MFBC-00017CH*	42.00	34.50-49.50	1.5	EAR99
MFBC-00008CH*	44.50	36.70-51.10	1.5	EAR99
MFB-5350CH	53.50	40.00-67.00	1.2	EAR99
MFBC-00018CH*	53.75	44.50-62.50	2.0	EAR99
MFBC-00009CH*	55.60	46.50-63.50	1.6	EAR99
MFBC-00019CH*	70.00	58.30-77.70	2.85	EAR99
MFBC-00020CH*	93.50	77.35-107.80	3.60	EAR99

FIXED FILTERS, Absorptive

Part Number	Center Freq (GHz)	1dBc Passband (GHz)	Insertion Loss in Passband (dB)	Passband Return Loss (dB)	Stopband Return Loss (dB)	ECCN
MFQH-00001CH*	19.90	18.50-21.30	3.40	25	12	EAR99

***New Release**

All electrical specifications given are typical values.

IQ MIXERS

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	Image Rej (dBc)	L-R Isolation (dB)	ECCN
MMIQ-0218(L/H)CH	2-18	DC-3	8/7.5	27/35	58/53	EAR99
MMIQ-0416(L/H)CH	4-16	DC-6	9	28/29	58/59	EAR99
MMIQ-0520(L/H)CH	5-20	DC-6	9	35	46	EAR99
MMIQ-0626(L/H)CH	6-26	DC-6	9	35	41	EAR99
MMIQ-1037HCH	10-37	DC-12	9	25	47	EAR99
MMIQ-1040(L/S)CH	10-40	DC-12	9	25	47/44	EAR99
MMIQ-1865(L/H/S)CH	18-65	DC-23	9	35	49/48/50	EAR99
MMIQ-40100(L/H)CH	40-100	DC-20	10	30	see datasheet	EAR99
MMIQ-30120HCH[1]	30-120	DC-30	8.5	27	40	EAR99

[1]Differential IF IQ Mixer

MIXERS, Double Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	ECCN
MM1-0115HCH	1-15	DC-2.5	7.5	+21	+17	EAR99
MM1-0212(L/H/S)CH	2-12	DC-3	8/8.5/8.5	+13/+23/+26	+9/+15/+20	EAR99
MM1-0222(L/H)CH	2-22	DC-3.5	8.5	+12/+20	+9/+15	EAR99
MM1-0312(H/S)CH	3-12	DC-4.5	7.5	+19/+24	+15/+20	EAR99
MM1-0320(L/H)CH	3-20	DC-4	8	+10/+20	+7/+15	EAR99
MM1-0330(H/T)CH	3-30	DC-5	7/9	+21/+32	+19/+23	EAR99
MM1-0424SCH	4.5-24	DC-4	8	+25	+20	EAR99
MM1-0626(H/S)CH	6-26.5	DC-9	7.5/8	+21/+25	+15/+20	EAR99
MM1-0832(L/H)CH	8-32	DC-12	8/7.5	+14/+23	+9/+15	EAR99
MM1-1044(L/H)CH	10-44	DC-14	7.5	+13/+22	+9/+15	EAR99
MM1-1140HCH	11-40	DC-12	8	+21	+15	EAR99
MM1-1240SCH	12-40	DC-12	8	+25	+20	EAR99
MM1-1467(L/H)CH	14-67	DC-21	7	+12/+18	+13/+15	EAR99
MM1-1850(H/S)CH	18-50	DC-20	8/8.5	+21/+25	+15/+20	EAR99
MM1-1857(L/H)CH	18-57	DC-21	8/7.5	+13/+20	+9/+13	EAR99
MM1-2567LCH	25-67	DC-30	9	+9	+13	EAR99
MM1-30100LCH	30-100	DC-20	8.5	see datasheet	+14	EAR99
MM1-35130HCH	35-130	DC-50	8	see datasheet	+12	EAR99
MMH-35120HCH[1]	35-120, 12-40	DC-14	18	+7	+15	3A001.b.7.c.1

[1]Harmonic Mixer

MIXERS, Triple Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	ECCN
MM2-0530(L/H)CH	5-30	2-20	10/9	+19/+28	+15/+20	EAR99
MT3A-0113HCH[1]	1-13	0.5-8.5	8.5	+28	+8	EAR99
MT3L-0113HCH	1.5-13	0.25-5	8.5	+31	+20	EAR99
MT3H-0113(L/H)CH	1.5-13	0.8-8.5	8/8.5	+20/+28	+15/+20	EAR99

[1]Integrated low phase noise driver amplifier

***New Release**

All electrical specifications given are typical values.

HYBRIDS, 90° Quadrature

Part Number	Band (GHz)	Amplitude Balance (dB)	Phase Balance (°)	Isolation (dB)	ECCN
MQS-0209CH	2-9	±0.5	±3	16	EAR99
MQS-0218CH	2-18	±1	±3	17	EAR99
MQH-2R58R5CH	2.5-8.5	±0.4	±3	23	EAR99
MQH-3R510CH	3.5-10	±0.4	±1.5	25	EAR99
MQS-0418CH	4-18	±0.4	±0.5	20	EAR99
MQH-0517CH	5-17	±0.5	±6	23	EAR99
MQH-0920CH	9-20	±0.55	±2	21.5	EAR99
MQH-1434CH	14-34	±0.7	±4.5	17	EAR99
MQH-1842CH	18-42	±1.5	±4	15	EAR99

LIMITERS

Part Number	Band (GHz)	Loss (dB)	Flat Leakage (dBm)	Peak Power CW (W)	Peak Power, Pulsed (W)	P1dB (dBm)	ECCN
HLM-8011CH	DC-30	0.4	+7@30GHz	1	4.5	+10	EAR99
HLM-40CH	DC-40	0.5	+16@20GHz	4	20	+15	EAR99

PASSIVE MULTIPLIERS & NON LINEAR TRANSMISSION LINES

Part Number	Type	Input (GHz)	Output (GHz)	1F Supp (dBc)	3F Supp (dBc)	ECCN
MMD-0415HCH	Doubler	2-7.5	4-15	27	36	EAR99
MMD-1030(L/H)CH	Doubler	5-15	10-30	38/41	46/47	EAR99
MMD-1250HCH	Doubler	6-25	12-50	32	40	EAR99
MMD-1648LCH	Doubler	8-24	16-48	44	69	EAR99
MMD-2060(L/H)CH	Doubler	10-30	20-60	37/38	41/40	EAR99
MMD-3580LCH	Doubler	17.5-40	35-80	38	44	EAR99
MMD-20100HCH	Doubler	10-50	20-100	24.5	33	3A001.b.7.b.1
MMD-40120HCH	Doubler	20-60	40-120	30	40	3A001.b.7.b.1
MMQ-40125HCH	Quadrupler	10-31.25	40-125	19	12	3A001.b.7.b.1
NLTL-6273CH	Comb Generator	0.7-5	0.7-40	—	—	EAR99
NLTL-6275CH	Comb Generator	3-15	3-85	—	—	EAR99

POWER DIVIDERS, 1:2

Part Number	Band (GHz)	Amplitude Balance (dB)	Phase Balance (dB)	Isolation (dB)	ECCN
MPD-0226CH	2-26.5	±0.2	±2	20	EAR99

***New Release**

All electrical specifications given are typical values.

SURFACE MOUNTS

AMPLIFIERS, LO Driver

Part Number	Band (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	Bias Voltage (V)	Bias Current (mA)	Package	ECCN
ADM-0012-5931SM	DC-12	11	+18	+26	+3 to +7 VD and -0.3 to 0 VG	85	3mm QFN	EAR99
ADM-0026-5929SM	DC-26.5	13	+20	+26	+3 to +7 VD and -0.3 to 0 VG	165	4mm QFN	EAR99
APM-7099SM[1]	0.01-20	14	+25	+27	+5 to +8 VC and +5 to +8 VB	72	4mm QFN	EAR99
APM-7098SM[1]	0.1-22	15	+23	+22	+5 to +8 VC and +5 to +8 VB	44	4mm QFN	EAR99
AMM-7473PSM	0.4-27	17	+25	+34	+5 to +7 VD and -0.7 to -0.6 VG	150	4mm QFN	EAR99
APM-7516PSM	1.5-20	11	+22	+33	+5 VC and +5 VB	106	4mm QFN	EAR99
APM-6849SM[1]	2-30	11	+21	+20	+5 VC and +5 VB	23	3mm QFN	EAR99
ADM-8007PSM	2-40	23	+24	+30	+3 to +6 VD and +3 to +6 VG	218	4mm QFN	3A001.b.2.d
AMM-7199SM	11-38	21	+21	+29	+3 to +4 VD and -0.6 to -0.4 VG	180	3mm QFN	3A001.b.2.d
AMM-7200SM	12-46	18	+22	+29	+3 to +4 VD and -0.6 to -0.4 VG	180	3mm QFN	3A001.b.2.d
AMM-6702SM	20-50	28	+22	+27	+3 to +4 VD and -0.6 to -0.4 VG	200	4mm KFN	3A001.b.2.d

[1]Low Phase Noise

AMPLIFIERS, Gain Block & Low Noise

Part Number	Band (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA)	Package	ECCN
ADM-8622PSM	DC-10	15.5	2	+13.5	+26	+3.3 VD	40	1.3x2mm DFN	EAR99
AKA-1300PSM	DC-14	13	5	+14	+28	+3.8 VD	50	1.3x2mm DFN	EAR99
AKA-1310PSM	DC-14	13	5	+14	+28	+4.6 VD	50	1.3x2mm DFN	EAR99
AKA-1400PSM	DC-14	17	4	+15	+28	+3.8 VD	50	1.3x2mm DFN	EAR99
AKA-1500PSM	DC-14	19	4	+16	+28	+4.2 VD	50	1.3x2mm DFN	EAR99
ADM-8350PSM	0.09-6	22	1.8	+22	+39.5	+5 VD	84	1.3x2mm DFN	EAR99
ADM-8096PSM	0.09-6	22	1.5	+21	+33	+5 VD	58	1.3x2mm DFN	EAR99
ADM-8095PSM	0.09-10	18	1.2	+18	+30	+5 VD	39	1.3x2mm DFN	EAR99
ADM-8624PSM	0.2-20	11.5	2.8	+13.5	+25	+5 VD	40	1.3x2mm DFN	EAR99
ADM-8475PSM	0.5-18	13	2	+16	+27	+5 VD	40	1.3x2mm DFN	EAR99
ADM-8625PSM	0.75-8	18	1.5	+17	+26	+5 VD	49	3mm QFN	EAR99
ADM-8536PSM	2-20	10	2.5	+13	+25	+5 VD	41	1.3x2mm DFN	EAR99

ATTENUATORS

Part Number	Band (GHz)	Attenuation (dB)	Accuracy (dB)	Return Loss (dB)	Package	ECCN
✦ ATN00-0040PSM*	DC-40	0	see datasheet	27	1.3x2mm DFN	EAR99
✦ ATN03-0040PSM*	DC-40	3	see datasheet	25	1.3x2mm DFN	EAR99
✦ ATN06-0040PSM*	DC-40	6	see datasheet	22	1.3x2mm DFN	EAR99
✦ ATN10-0040PSM*	DC-40	10	see datasheet	25	1.3x2mm DFN	EAR99
ATN03-0050CSP1	DC-50	3	see datasheet	20	1.5mm CSP	EAR99
ATN06-0050CSP1	DC-50	6	see datasheet	20	1.5mm CSP	EAR99
ATN10-0050CSP1	DC-50	10	see datasheet	24	1.5mm CSP	EAR99

***New Release**

All electrical specifications given are typical values.

BALUNS

Part Number	Band (GHz)	Amp Bal (dB)	Phase Bal (°)	Isolation (dB)	Impedance Ratio	Total Insertion Loss as a Mode Converter (dB)	Package	ECCN
BAL-0003SMG	0.0005-3	0.3	3	9	1:2	3.8	SMG	EAR99
BALH-0003SMG	0.0005-3	0.2	2	7	1:1	2	SMG	EAR99
BALE-0003SMG	0.01-3	0.2	1	9	1:2	4	SMG	EAR99
✦ **BALHE-0003SMG***	0.01-3	0.2	2	7	1:1	2	SMG	EAR99
BAL-0006SMG	0.0005-6	0.4	3	8	1:2	4	SMG	EAR99
BALH-0006SMG	0.0005-6	0.2	3	6	1:1	2	SMG	EAR99
BALE-0006SMG	0.01-6	0.4	1	9	1:2	4	SMG	EAR99
✦ **BALHE-0006SMG***	0.01-6	0.2	3	6	1:1	3	SMG	EAR99
BAL-0009SMG	0.0005-9	0.6	5	8	1:2	4.5	SMG	EAR99
BALH-0009SMG	0.0005-9	0.8	5	6	1:1	2.5	SMG	EAR99
BALE-0009SMG	0.01-9	0.5	4	9	1:2	4.5	SMG	EAR99
✦ **BALHE-0009SMG***	0.01-9	0.5	5	9	1:1	4.5	SMG	EAR99
MBAL-0104SM	1-4	0.2	2	8	1:2	2.5	4mm QFN	EAR99
BAL-0208SMG	2-8	0.3	1	17	1:2	2.5	SMG	EAR99
BAL-0416SMG	4-16	0.4	1	15	1:2	3.3	SMG	EAR99
BAL-0012SSG	0.01-12	0.6	5	8	1:2	5	SSG	EAR99
BALH-0012SSG	0.01-12	0.6	5	5.5	1:1	2	SSG	EAR99
BAL-0020SLG	0.01-20	0.4	5	12	1:2	4.5	SLG	EAR99
MBAL-0220SM	2-20	0.25	3	10	1:2	6	4mm QFN	EAR99
BAL-0620SMG	6-20	0.2	1	14	1:2	2.6	SMG	EAR99
BAL-0032SSG	0.01-32	0.5	5	8	1:2	5	SSG	EAR99
MBAL-1445SM	14-45	0.2	2	18	1:2	4.5	4mm QFN	EAR99

BIAS TEES

Part Number	Band (GHz)	Insertion Loss (dB)	DC Current (A)	DC Port Isolation (dB)	DC Voltage (V)	Package	ECCN
BT-0010SMG(-1/-2)	0.02-10	0.5	0.5	40	30	SMG	EAR99
BTL-0012SMG(-1/-2)	0.0005-12	0.5	0.5	35	30	SMG	EAR99
BTM-0026PSM-2	0.01-26	0.43	0.32	25	16	PSM	EAR99
BT-0026SMG(-1/-2)	0.02-26	1	0.5	40	35	SMG	EAR99
BTL-0026SMG(-1/-2)	0.0005-26	1	0.5	35	30	SMG	EAR99
BT-0035SMG(-1/-2)	0.02-35	1	0.5	35	30	SMG	EAR99
BTL-0035SMG(-1/-2)	0.0005-35	1	0.5	35	30	SMG	EAR99

COUPLER, Directional

Part Number	Band (GHz)	VSWR	Mean Coupling (dB)	Directivity (dB)	Package	ECCN
MC16-0222SM	2-22	1.22	16	19	4mm QFN	EAR99

HYBRIDS, 90° Quadrature

Part Number	Band (GHz)	Amp Bal (dB)	Phase Bal (°)	Isolation (dB)	Package	ECCN
MQS-0218SM	2-18	±1	±3	15	4mm QFN	EAR99
MQS-0518SM	5-18	±0.5	±2.5	17	4mm QFN	EAR99

***New Release**

All electrical specifications given are typical values.

EQUALIZERS, Positive Gain Slope

Part Number	Band (GHz)	Low Freq Attenuation (dB)	Typ Return Loss (dB)	Package	ECCN
MEQX-7ASM	DC-7	3, 6, 10 & 12.5	29, 29, 27, 27	3mm QFN	EAR99
MEQX-14ASM	DC-14	3, 6 & 10	23, 28, 29	3mm QFN	EAR99
MEQX-20ASM	DC-20	3, 5, 6, 7.5, 10 & 11	19, 22, 23, 26, 20, 27	3mm QFN	EAR99
MEQ6-26CSP1	DC-26	6	23	1.5mm CSP	EAR99
MEQ10-26CSP1	DC-26	10	17	1.5mm CSP	EAR99
MEQ06-45CSP1	DC-45	6	17	1.5mm CSP	EAR99
MEQ10-45CSP1	DC-45	10	13	1.5mm CSP	EAR99

DIPLEXERS

Part Number	Passband Low (GHz)	Passband High (GHz)	Isolation (dB)	Package	ECCN
DPX-M50(-1/-2)	DC-0.035	0.07-10	24	SM	EAR99
DPX-0R5(-1/-2)	DC-0.36	0.7-8	24	SM	EAR99
DPX-1(-1/-2)	DC-0.85	1.4-5	24	SM	EAR99
DPX-2(-1/-2)	DC-1.5	2.7-7	25	SM	EAR99
DPX-3(-1/-2)	DC-2.3	4.2-8	25	SM	EAR99
DPX-4(-1/-2)	DC-2.8	5.5-12	30	SM	EAR99
MDPX-0305PSM	DC-3	5-26.5	37	3mm QFN	EAR99
MDPX-0407PSM	DC-4	7-26.5	38	3mm QFN	EAR99

FIXED FILTERS, Lowpass

Part Number	3dB Cutoff (GHz)	Passband Insertion Loss (dB)	Passband Return Loss (dB)	Stopband Frequency (GHz)	Stopband Suppression (dB)	Package	ECCN
MFLP-00001PSM	6.10	0.80	21	7.50-40.00	57	4mm QFN	EAR99
MFLP-00002PSM	9.40	0.70	23	12.00-40.00	52	4mm QFN	EAR99
MFLP-00003PSM	12.30	0.50	21	16.00-40.00	52	4mm QFN	EAR99
MFLP-00004PSM	15.40	0.60	21	20.00-40.00	49	4mm QFN	EAR99
MFLP-00005PSM	18.50	0.50	21	22.00-40.00	49	4mm QFN	EAR99

FIXED FILTERS, Highpass

Part Number	3dB Cutoff (GHz)	Passband Insertion Loss (dB)	Passband Return Loss (dB)	Stopband Frequency (GHz)	Stopband Suppression (dB)	Package	ECCN
MFHP-00001PSM	2.00	0.40	19	DC-1.00	79	4mm QFN	EAR99
✦ **MFHP-00004PSM***	6.00	0.40	20	DC-3.30	60	4mm QFN	EAR99
✦ **MFHP-00005PSM***	8.00	0.50	21	DC-4.80	65	4mm QFN	EAR99
MFHP-00002PSM	9.80	0.40	17	DC-7.50	53	4mm QFN	EAR99
✦ **MFHP-00006PSM***	12.00	0.50	21	DC-8.30	55	4mm QFN	EAR99
MFHP-00003PSM	15.40	0.70	17	DC-12.70	53	4mm QFN	EAR99

FIXED FILTERS, Absorptive

Part Number	Center Freq (GHz)	1dBc Passband (GHz)	Insertion Loss in Passband (dB)	Passband Return Loss (dB)	Stopband Return Loss (dB)	Package	ECCN
✦ **MFQH-00001PSM***	19.80	18.50-21.20	3.20	24	13	5mm QFN	EAR99

***New Release**

All electrical specifications given are typical values.

FIXED FILTERS, Bandpass

Part Number	Center Freq (GHz)	1dBc Passband (GHz)	Insertion Loss in Passband (dB)	Package	ECCN
MFBP-00010PSM	3.45	2.20-5.90	1.50	5mm QFN	EAR99
MFBP-00011PSM	4.00	2.30-8.05	1.24	5mm QFN	EAR99
✦ **MFBP-00001PSM***	5.40	4.70-6.20	1.30	4mm QFN	EAR99
✦ **MFBP-00002PSM***	6.60	5.90-7.50	1.50	4mm QFN	EAR99
MFBP-00004PSM	7.75	6.05-10.30	1.85	5mm QFN	EAR99
FB-0785SMG	7.85	7.25-8.45	2.20	SMG	EAR99
FB-0850SM	8.50	7.85-9.20	2.00	SM	EAR99
MFBC-00001PSM	8.70	7.40-9.90	2.00	5mm QFN	EAR99
FB-0900SM	9.00	8.40-9.60	2.20	SM	EAR99
FB-0955SM	9.55	8.90-10.20	2.00	SM	EAR99
MFBA-00004PSM	10.00	8.40-12.25	1.90	5mm QFN	EAR99
MFBP-00006PSM	10.20	8.20-13.50	1.83	5mm QFN	EAR99
MFBP-00005PSM	10.40	6.25-18.05	1.10	5mm QFN	EAR99
FB-1050SM	10.50	9.60-11.40	2.00	SM	EAR99
MFBC-00002PSM	11.00	9.13-12.40	1.80	5mm QFN	EAR99
FB-1140SM	11.40	10.45-12.35	2.00	SM	EAR99
MFBP-00008PSM	11.85	10.40-13.85	1.73	5mm QFN	EAR99
MFBA-00003PSM	12.00	10.10-14.10	2.10	5mm QFN	EAR99
FB-1215SM	12.15	11.35-12.95	2.00	SM	EAR99
FB-1300SMG	13.00	12.00-14.00	2.00	SMG	EAR99
MFBP-00007PSM	13.40	10.25-18.25	1.80	5mm QFN	EAR99
MFBC-00003PSM	14.15	11.85-15.90	1.70	5mm QFN	EAR99
FB-1445SM	14.45	13.20-15.70	2.00	SM	EAR99
MFB-1445SM	14.45	13.60-15.10	3.80	3mm QFN	EAR99
FB-1575SMG	15.75	14.60-16.90	2.00	SMG	EAR99
MFBP-00009PSM	15.85	14.10-17.85	1.86	5mm QFN	EAR99
MFBA-00001PSM	16.00	14.10-17.90	2.40	5mm QFN	EAR99
MFBC-00010PSM	16.50	14.60-18.90	1.70	5mm QFN	EAR99
MFBC-00004PSM	17.50	14.90-19.90	1.60	5mm QFN	EAR99
MFBC-00011PSM	18.50	16.15-20.70	1.70	5mm QFN	EAR99
MFBC-00012PSM	20.30	17.20-23.40	1.55	5mm QFN	EAR99
MFBC-00005PSM	22.00	18.60-25.10	1.40	5mm QFN	EAR99
MFBA-00002PSM	22.20	18.10-26.00	1.80	5mm QFN	EAR99
MFBC-00013PSM	22.50	19.50-26.20	1.50	5mm QFN	EAR99
MFBC-00014PSM	25.75	22.20-29.90	1.75	5mm QFN	EAR99
MFBC-00006PSM	28.00	23.60-32.20	1.6	5mm QFN	EAR99
MFBC-00015PSM	30.00	25.40-34.70	1.39	5mm QFN	EAR99
MFBC-00007PSM	35.00	30.10-39.30	1.5	5mm QFN	EAR99
MFBC-00016PSM	36.00	30.60-41.00	1.21	5mm QFN	EAR99

***New Release**

All electrical specifications given are typical values.

CONFIGURABLE FILTERS, Tunable

Part Number	Center Freq (GHz)	3dBc Passband (GHz)	Insertion Loss at Center Freq (dB)	Passband Return Loss (dB)	Stopband Rejection (dB)	OIP3 (dBm)	Package	ECCN
✦ MFBT-00001PSM*	3.50-9.50	3.00-10.00	6.50	15	35	33	4mm QFN	3A001.b.5.a
✦ MFBT-00002PSM*	5.50-15.50	4.50-16.50	6.50	15	35	33	4mm QFN	3A001.b.5.a
✦ MFBT-00003PSM*	10.00-26.00	8.00-30.00	7.50	10	35	35	4mm QFN	3A001.b.5.a

LIMITERS

Part Number	Band (GHz)	Loss (dB)	Flat Leakage (dBm)	Average Power Handling (W)	Peak Power Handling (W)	P1dB (dBm)	Package	ECCN
DLM-10SM	DC-10	0.75	Adjustable	0.5	—	+10	3mm QFN	EAR99
HLM-20PSM	DC-20	0.5	+16@10GHz	5	50	+15	4mm QFN	EAR99
HLM-40PSM	DC-40	0.5	+15@20GHz	2.5	9.5	+14	4mm QFN	EAR99
HLM-8010CSP1	DC-40	0.5	+10@20GHz	1.9	3.2	+11	1.5mm CSP1	EAR99

SWITCHES

Part Number	Band (GHz)	Insertion Loss (dB)	Isolation dB)	IIP3 (dB)	Package	ECCN
MSW2-1001ELGA	0.1-40	1.2	38	50	2.25mm LGA	EAR99

IQ MIXERS

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	Image Rej (dBc)	L-R Isolation (dB)	Package	ECCN
MMIQ-0106HCSM	1.5-5.5	DC-3	8	33	62	5mm QFN	EAR99
MMIQ-0205HSM	1.75-5	DC-2	8	32	61	5mm QFN	EAR99
MMIQ-0218(L/H)SM	2-18	DC-3	8	27/35	58/53	6mm QFN	EAR99
MMIQ-0416(L/H)SM	4-16	DC-6	9/8.5	35/31	51	4mm QFN	EAR99
MMIQ-0520(L/H)SM	5-20	DC-6	9	35	46/39	4mm QFN	EAR99
MMIQ-0626(L/H)SM	6-26	DC-6	9	35	39/36	4mm QFN	EAR99
MMIQ-1040(L/H)SM	10-40	DC-10	9	35	50/40	4mm QFN	EAR99
MMIQ-1867(L/H)SM	18-67	DC-23	9	32/29	48.5/44	4mm QFN	EAR99

IQ MIXERS, Integrated Drive

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	Image Rej (dBc)	LO Drive (dBm)	Package	ECCN
✦ MMIQA-1040HPSM*	10-40	DC-10	9	29	+0 to +8	7mm QFN	EAR99

***New Release**

All electrical specifications given are typical values.

MIXERS, Double Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	Package	ECCN
MM1-0115HPSM	1-15	DC-2.5	8	+21	+17	4mm QFN	EAR99
MM1-0212(L/H/S)SM	2-12	DC-3	8.5/8.5/9	+13/+25/+28	+9/+15/+20	4mm QFN	EAR99
MM1-0222(L/H)SM	2-22	DC-3.5	7/7.5	+11.5/+20	+11/+20	3mm QFN	EAR99
MM1-0312(H/S)SM	3-12	DC-4.5	7	+19/+24	+15/+20	3mm QFN	EAR99
MM1-0320HSM	3-20	DC-4	8	+20	+15	3mm QFN	EAR99
MM1-0424SSM	4.5-24	DC-4	8	+25	+20	3mm QFN	EAR99
MM1-0626(H/S)SM	6-26.5	DC-9	7.5/8	+21/+24.5	+15/+20	3mm QFN	EAR99
MM1-0726HSM	7-26.5	DC-9	7.5	+17	+20	3mm QFN	EAR99
MM1-0832(L/H)SM	8-32	DC-12	8.5/8	+11/+20.5	+9/+15	3mm QFN	EAR99
MM1-0832HPSM	8-32	DC-12	8	+23	+15	3mm QFN	EAR99
MM1-1040HPSM	10-40	DC-12	9	+20	+15	3mm QFN	EAR99
MM1-1130HSM	11-30	DC-12	7	+21	+15	3mm QFN	EAR99
MM1-1453(L/H)SM	14-53	DC-22	8/7.6	+13/+17	+13/+15	4mm QFN	EAR99
MM1-1850(H/S)SM	18-50	DC-21	8.7/9.7	+17/+28	+15/+20	4mm KFN	EAR99
MM1-2567LSM	25-67	DC-30	11	+9	+9	3mm QFN	EAR99

MIXERS, Triple Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	Package	ECCN
MM2-0530(L/H)SM	5-30	2-20	10/9	+19/+28	+15/+20	4mm QFN	EAR99
MM2D-0528SCSM[1]	5-28	DC-12	10	+31	+28	4mm QFN	EAR99
MT3-0113(L/H/S)CQG	1.5-13	0.01-7	7.5/7.5/8.5	+24/+30/+36	+15/+20/+27	CQG	EAR99
MT3D-0113LSM[1]	1.5-13	see plots	7.5	+27	+17	4mm QFN	EAR99
MT3D-0325HCSM[1]	3-25	DC-6	7.5	+25	+20	4mm QFN	EAR99
MT3L-0113HSM	1.5-13	0.25-5	8.5	+20	+31	4mm QFN	EAR99
MT3H-0113(L/H)SM	1.5-13	0.8-8.5	8	+22/+29	+15/+20	4mm QFN	EAR99
T3-18GLCTG(-1/-2)	0.01-18	0.001-10	7.5	+30	+20	CQG	EAR99
T3H-18GLCTG(-1/-2)	0.01-18	0.01-18	9.5	+30	+20	CQG	EAR99
T3-20GLCTG(-1/-2)	0.01-20	0.001-10	7.5	+30	+20	CQG	EAR99
T3H-20GLCTG(-1/-2)	0.01-20	0.01-18	9.5	+30	+20	CQG	EAR99

[1]Differential IF

***New Release**

All electrical specifications given are typical values.

MIXERS, Integrated Drive

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	Package	ECCN
MT3A-0113HCSM	1.5-13	0.5-8.5	9.5	+28	+5 to +15	6mm QFN	EAR99
MM1A-0222HPSM	2-22	DC-3.5	7.5	+17	+3 to +15	5mm QFN	EAR99
MM1A-0622HPSM	6-22	DC-9	7.5	+21	+3 to +15	5mm QFN	EAR99
MM1A-0832HPSM	8-32	DC-12	9	+24	-6 to +6	3x4.6mm QFN	EAR99
MM1A-1040HPSM	10-40	DC-12	10	+23	+3 to +9	3x4.6mm QFN	EAR99
MM1A-1855HPSM	18-55	DC-21	9	+20	+4 to +10	3x4.6mm QFN	EAR99

PASSIVE MULTIPLIERS & NON LINEAR TRANSMISSION LINES

Part Number	Type	Input (GHz)	Output (GHz)	1F Supp (dBc)	3F Supp (dBc)	Package	ECCN
MMD-0415HPSM	Doubler	2-7.5	4-15	27	38	3mm QFN	EAR99
MMD-1030(LC/H)SM	Doubler	5-15	10-30	31/34	43/46	3mm QFN	EAR99
MMD-2050(L/H)SM	Doubler	10-25	20-50	35/33	46/40	3mm QFN	EAR99
NLTL-6794SM	Comb Generator	0.1-1	0.1-30	–	–	6mm QFN	EAR99
NLTL-6796SM	Comb Generator	0.5-3.5	0.5-50	–	–	6mm QFN	EAR99
NLTL-6273SM	Comb Generator	0.7-5	0.7-24	–	–	5mm QFN	EAR99

POWER DIVIDERS

Part Number	Band (GHz)	Excess Loss (dB)	Amp Bal (dB)	Isolation (dB)	Type	Package	ECCN
PD-0030SMG	DC-30	1	±0.25	6	Resistive	SMG	EAR99
PBR-0003SMG	0.01-3	1.5	±0.8	40	High Isolation	SMG	EAR99
PBR-0006SMG	0.01-6	1.7	±0.8	35	High Isolation	SMG	EAR99
PBR-0012SMG	0.01-12	1.7	±1	30	High Isolation	SMG	EAR99
MPD-0226SM	2-26.5	1.5 to 3	±0.2	20	Wilkinson	4mm QFN	EAR99
PD-0434SM	4-34	1.5	±0.25	20	High Isolation	SM	EAR99
PD-0530SMG	5-30	1.5	±0.1	25	Wilkinson	SMG	EAR99
PD-0535SM	5-35	1.5	±0.25	18	Wilkinson	SM	EAR99
✦ **MPDR-0070CSP2***	DC-70	1.5	±0.25	see table	Resistive	2.5mm CSP2	EAR99

***New Release**

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CONNECTORIZED MODULES

AMPLIFIERS

Part Number	Band (GHz)	Gain (dB)	Psat (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA)	ECCN
ADM3-00001PD	0.0003-18	37	+23	+31	See Datasheet	120, 120, 100	EAR99
ADM1-0026PA	0.005-26.5	12	+20	+25	+3 to +7 VD and -0.3 to 0 VG	165	EAR99
ADM3-0022PA	0.01-22	35	+30	+31	See Datasheet	115, 115, 450	EAR99
APM-7099PA	0.1-20	14	+25	+24	+8 VC and +7 VB	72	EAR99
APM-7098PA	0.1-22	14	+23	+24	+8 VC and +7 VB	44	EAR99
ADM2-0035PA	0.1-35	23	+23	+30	+3 to +7 VD and -0.3 to 0 VG	320	EAR99
AMM-7473PC	0.4-26.5	16	+25	+34	+5 to +7 VD and -0.7 to -0.6 VG	150	EAR99
APM-7516PA	1-22	12.5	+23	+33	+5 VC and +5 VB	106	EAR99
APM-6849PA	2-30	11	+21	+21	+7 VC and +7 VB	21	EAR99
ADM1-8007PC	2-40	22	+22	+30	+3 to +6 VD and +3 to +6VG	213	EAR99
AMM-7199UC	11-38	20.5	+21	+31	+3 to +4 VD and -0.6 to -0.4 VG	180	EAR99
AMM-7200UC	12-46	18	+21.5	+29	+3 to +4 VD and -0.6 to -0.4 VG	180	EAR99
AMM-6702(UC/UC5)	20-55	24	+21	+27	+3 to +4 VD and -0.6 to -0.4 VG	180/230	EAR99
AMM-8211UC5	22-57	13	+21	+27	+3.5 to +5.5 VB	175	EAR99
AMM-7203UC	30-60	11.5	+16	+21	+1.5 to +3 VD and -0.6 to -0.4 VG	80	EAR99
A-3567UC	35-67	18	+20	+26	+3 to +4 VD and -0.6 to -0.4 VG	300	EAR99
AMM-0001M	45-95	11	+18	-	+1.5 to 4V VD and -1.5V to 0V VG	350	3A001.b.4.e.2

AMPLIFIERS, Gain Block & Low Noise

Part Number	Band (GHz)	Gain (dB)	NF (dB)	OP1dB (dBm)	OIP3 (dBm)	Voltage (V)	Current (mA)	ECCN
ADM-8344PC	DC-18	18	1.4	+18	+27	+5 VD	103	EAR99
ADM-8558PC	DC-20	15	2.2	+14	+23	+6 VD	50	EAR99
ADM-8622PC	0.0003-10	15	2.1	+13	+27	+3.3 VD	42	EAR99
ADM1-8096PC	0.09-6	22.5	1.5	+23	+35	+5 VD	84	EAR99
ADM1-8095PC	0.09-10	18	1.6	+18.5	+32	+5 VD	57	EAR99
ADM-8624PC	0.2-20	10.5	3	+13.5	+26	+5 VD	40	EAR99
ADM-8556PC	6-20	23	1.7	+17	+26	+3 VD	67	EAR99

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BALUNS

Part Number	Band (GHz)	Amp Bal (dB)	Phase Bal (°)	Isolation (dB)	Turns Ratio	Total Insertion Loss as a Mode Converter (dB)	ECCN
BAL-0003	0.0002-3	0.05	1	8	1:2	4	EAR99
BALH-0003	0.0002-3	0.1	1	7	1:1	1.5	EAR99
BAL-0006	0.0002-6	0.05	1	9	1:2	4.5	EAR99
BALH-0006	0.0002-6	0.1	1	8	1:1	2.5	EAR99
BAL-0010	0.0002-10	0.2	2	9	1:2	5	EAR99
BALH-0010	0.0002-10	0.2	2	8	1:1	2.5	EAR99
BAL-0106	1.2-6	0.1	2	6	1:2	0.6	EAR99
BAL-0212	2.6-12	0.1	2	6	1:2	1	EAR99
BAL-0520	5-20	0.2	3	6	1:2	1.5	EAR99
EBAL-0026	0.01-26	1.0	1	3	1:2	3	EAR99
BAL-0026	0.0003-26.5	0.5	3	24	1:2	2.5	EAR99
BAL-0036	0.0003-36	0.5	3	24	1:2	3	EAR99
EBAL-0040	0.01-40	0.1	2	5	1:2	3	EAR99
BAL-0050	0.0003-50	0.7	4	25	1:2	7	EAR99
EBAL-0050	0.01-50	0.2	3	5	1:2	4	EAR99
BAL-0067	0.0003-67	0.7	4	25	1:2	8.5	EAR99
EBAL-0067	0.01-67	0.2	2	5	1:2	4	EAR99

PULSE INVERTERS, Broadband, Fast Rise Time

Part Number	Band (GHz)	Loss (dB)	Rise/Fall Time (ps)	ECCN
INV-0026	0.0001-26.5	2	13	EAR99
INV-0040	0.0001-40	2.5	13	EAR99
INV-0065	0.0001-65	5	12	EAR99

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BIAS TEES

Part Number	Band (GHz)	DC Voltage (V)	DC Current (A)	Insertion Loss (dB)	ECCN
BT-0018	0.00004-18	30	0.5	0.6	EAR99
BTN1-0018	0.0005-18	50	1	0.7	EAR99
BTN2-0018	0.003-18	50	2	0.7	EAR99
BT-0025	0.00004-25	30	0.5	0.8	EAR99
BT-0026	0.01-26.5	30	0.5	0.8	EAR99
BT1-0026	0.0002-26.5	50	1	1	EAR99
BT2-0026	0.0002-26.5	50	2	1	EAR99
BTN1-0026	0.0005-26.5	50	1	1	EAR99
BTN2-0026	0.003-26.5	50	2	1	EAR99
BT-0040	0.000004-40	30	0.5	1.5	EAR99
BTN-0040	0.00004-40	30	0.5	1.5	EAR99
BT1-0040	0.0002-40	50	1	1.5	EAR99
BT2-0040	0.0002-40	50	2	1.5	EAR99
BTN1-0040	0.0005-40	50	1	1.5	EAR99
BTN2-0040	0.003-40	50	2	1.5	EAR99
BT-0050	0.0002-50	30	0.5	1.8	EAR99
BTN-0050	0.0002-50	30	0.5	1.8	EAR99
BT1-0050	0.0002-50	50	1	1.5	EAR99
BT2-0050	0.0002-50	50	2	1.5	EAR99
BTN1-0050	0.0005-50	50	1	1.5	EAR99
BTN2-0050	0.003-50	50	2	1.5	EAR99
BT-0065	0.000004-65	30	0.5	1.8	EAR99
BTN-0065	0.00004-65	30	0.5	2.0	EAR99

COUPLERS, Elite Stripline Directional

Part Number	Band (GHz)	Coupling (dB)	IL Corrected Directivity (dB)	Flatness (dB)	VSWR	ECCN
CE10-0R620T	0.6-20	10	27	±0.2	1.07	EAR99
CE10-0R640(T)	0.6-40	10	24/22	±0.2	1.07/1.08	EAR99
CE10-1R520(T)	1.5-20	10	32	±0.25	1.07	EAR99
CE10-1R540(T)	1.5-40	10	26/22	±0.25	1.07	EAR99
CE13-0220T	2-20	13	30	±0.15	1.07	EAR99
CE13-0240(T)	2-40	13	29/27	±0.15	1.07/1.08	EAR99
CE16-0220T	2-20	16	32	±0.1	1.07	EAR99
CE16-0240(T)	2-40	16	30/29	±0.1	1.07	EAR99
CE20-0R620T	0.6-20	20	26	±0.15	1.07	EAR99
CE20-1R640(T)	0.6-40	20	27/24	±0.15	1.07	EAR99
CE20-0220T	2-20	20	30	±0.1	1.07	EAR99
CE20-0R240(T)	2-40	20	33/28	±0.1	1.05/1.07	EAR99

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COUPLERS, High Directivity Bridge

Part Number	Band (GHz)	Coupling (dB)	Directivity (dB)	VSWR	ECCN
CBR16-0003	0.0002-3	16	40	1.1	EAR99
CBR16-0006	0.0002-6	16	38	1.15	EAR99
CBR16-0012	0.0002-12	16	32	1.25	EAR99
CBR17-0026	0.0002-26	17	23	1.22	EAR99

COUPLERS, Stripline Directional

Part Number	Band (GHz)	Coupling (dB)	Directivity (dB)	Flatness (dB)	VSWR	ECCN
C09-0R412	0.45-12	9	22	±0.7	1.15	EAR99
C09-0R418	0.45-18	9	22	±0.7	1.15	EAR99
C09-0R426	0.45-26.5	9	22	±0.7	1.15	EAR99
C09-0R430	0.45-30	9	20	±0.7	1.15	EAR99
C20-0R612	0.6-12	20	22	±0.6	1.2	EAR99
C10-0116	1-16	10	20	±0.5	1.15	EAR99
C20-0116	1-16	20	20	±0.6	1.15	EAR99
C20-0R518	0.5-18	20	22	±0.75	1.2	EAR99
C20-0R520	0.5-20	20	22	±0.75	1.2	EAR99
C13-0126	1-26.5	13	20	±0.6	1.15	EAR99
C16-1R718	1.7-18	16	20	±0.3	1.15	EAR99
C16-1R726	1.7-26.5	16	20	±0.4	1.15	EAR99
C10-0226	2-26.5	10	22	±0.6	1.15	EAR99
C20-0226	2-26.5	20	22	±0.75	1.25	EAR99
C13-0140	1-40	13	16	±0.1	1.2	EAR99
C20-0240	2-40	20	17	±0.75	1.3	EAR99
C13-0150	1-50	13	16	±0.75	1.2	EAR99
C10-0450	4-50	10	15	±0.5	1.35	EAR99
C10-0667	6-67	10	17	±0.8	1.2	EAR99
C16-0667	6-67	16	17	±0.9	1.25	EAR99
C20-0667	6-67	20	17	±0.8	1.25	EAR99
MC10-25110M2	25-110	10	19.5	+0.2	1.43	EAR99

COUPLERS, Low Loss High Power

Part Number	Band (GHz)	Coupling (dB)	Directivity (dB)	Loss (dB)	Average Power Handling (W)	ECCN
C17-0R506	0.5-6	17	20	0.4	120	EAR99
C17-0R512	0.5-12	17	20	0.65	80	EAR99
C17-0R518	0.5-18	17	20	1	60	EAR99
CA-18	DC-18	> 30	22	0.35	200	EAR99
CA-26	DC-26.5	> 27	24	0.35	50	EAR99
CA-40	DC-40	> 27	24	0.5	20	EAR99
CA-50	DC-50	> 27	24	0.5	15	EAR99
C-0250	2-50	12	15	0.7	10	EAR99
C-0265	2-65	12	15	0.7	10	EAR99

COUPLERS, Dual Directional

Part Number	Band (GHz)	Coupling (dB)	Directivity (dB)	Flatness (dB)	VSWR	ECCN
CD10-0106	0.7-6.3	10	25	±0.6	1.14	EAR99
CD10-0114	0.7-14.7	10	23	±0.6	1.17	EAR99

COUPLERS, Pick-Off Tees

Part Number	Band (GHz)	Pick-Off Loss (dB)	Insertion Loss (dB)	ECCN
PT-0020	DC-20	16	2	EAR99
PT-0030(A)	DC-30	16	2	EAR99

COUPLERS, 90° Quadrature Hybrids

Part Number	Band (GHz)	Amp Bal (dB)	Phase Bal (°)	Excess Loss (dB)	Isolation (dB)	ECCN
QH-0R518	0.5-18	±0.5	±3	1.5	20	EAR99
QH-0R71R3	0.65-1.3	±0.3	±3	0.5	16	EAR99
QH-0R714	0.7-14.5	±0.2	±2	1.2	22	EAR99
MQS-0209UB	2-9	±0.5	±3	2	16	EAR99
MQS-0218UA	2-18	±1	±3	1.4	17	EAR99
QH-0226	2-26.5	±0.25	±2	2	22	EAR99
MQH-2R58R5UB	2.5-8.5	±0.4	±3	2	23	EAR99
MQH-3R510UB	3.5-10	±0.4	±1.5	1.8	25	EAR99
MQS-0418UA	4-18	±0.4	±0.5	1.5	20	EAR99
QH-0440	4-40	±0.4	±5	2	18	EAR99
MQH-0517UB	5-17	±0.5	±6	1.6	23	EAR99
QH-0550	5-50	±0.6	±5	1	22	EAR99
QH-0867	8-67	±0.6	±6	1.2	18	EAR99
MQH-40110M2	40-110	1	5	2.5	18	EAR99

EQUALIZERS, Positive-Slope

Part Number	Band (GHz)	Loss at DC (dB)	Typ Return Loss (dB)	ECCN
EQX-26	DC-26	3, 6	21, 15	EAR99
EQX-40	DC-40	3, 6	18	EAR99
MEQX-26AS	DC-26.5	3, 6, 10	18, 20, 20	EAR99
MEQ10-50AU	DC-50	10	15	EAR99
Additional MMIC Equalizer modules available upon request.				EAR99

FIXED FILTERS: Lowpass, Highpass, Bandpass, Diplexer

The filters below are a small sample of Marki Microwave's extensive portfolio. Visit **markimicrowave.com** for the full catalog of filters.

LOWPASS

Part Number	3dB Cutoff (GHz)	Passband Insertion Loss (dB)	Passband Return Loss (dB)	Frequency @ 50 dB Supp (GHz)	ECCN
FLP-0490	4.9	0.6	30	9.3	EAR99
FLP-2650	26.5	1.5	15	36.5	EAR99
FLP-5000	50	2	15	62	EAR99

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HIGHPASS

Part Number	Cutoff (GHz)	30dB Rejection Freq (GHz)	50dB Rejection Freq (GHz)	80dB Rejection Freq (GHz)	ECCN
FH-1700	17	14	11.5	6	EAR99
FH-2600	26	21.5	18	11	EAR99
FH-5500	55	51	45	35	EAR99

BANDPASS

Part Number	Center Freq (GHz)	Low Freq 1dB Cutoff (GHz)	High Freq 1dB Cutoff (GHz)	Insertion Loss @ Center Freq (GHz)	ECCN
FB-0905	9.05	8.45	9.65	3.00	EAR99
MFB-3475U	34.75	28.90	39.40	2.80	EAR99
FB-4000	40.00	34.40	45.60	3.00	EAR99
MFBC-00017M	42.00	34.50	49.50	2.00	EAR99
MFBC-00008M	44.50	36.70	51.10	2.15	EAR99
MFBC-00018M	53.75	44.50	62.50	2.15	EAR99
MFBC-00009M	55.60	46.50	63.50	2.25	EAR99
MFBC-00019M	70.00	58.30	77.70	2.85	EAR99
MFBC-00020M	93.50	77.35	107.80	3.60	EAR99

DIPLEXERS

Part Number	Passband Low (GHz)	Passband High (GHz)	Isolation (dB)	ECCN
MDPX-0305	DC-3	5-26.5	47	EAR99
MDPX-0407	DC-4	7-26.5	38	EAR99
MDPX-0609	DC-6	9-26.5	58	EAR99

IQ MIXERS

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	Image Rej (dBc)	L-R Isolation (dB)	ECCN
MMIQ-0205HXA	1.75-5	DC-2	8	32	61	EAR99
MMIQ-0218(L/H)XPC	2-18	DC-3	8/7.5	27/35	58/53	EAR99
MMIQ-0416(L/H)S	4-16	DC-6	9	28/29	58/59	EAR99
MMIQ-0520(L/H)S	5-20	DC-6	9	35	46	EAR99
MMIQ-0626(L/H)S	6-26	DC-6	9	35	41	EAR99
MMIQ-1037H	10-37	DC-12	9	25	47	EAR99
MMIQ-1040(L/S)S	10-40	DC-12	9	25	47/44	EAR99
MMIQ-1865(L/H/S)UB	18-65	DC-23	9	35	49/48/50	EAR99
MMIQ-4067LU	40-67	DC-20	9	35	33	EAR99
MMIQ-40100(L/H)M	40-100	DC-20	10	30	see datasheet	EAR99
MMIQ-30120HM[1]	30-120	DC-30	8.5	27	40	EAR99

[1]Differential IF IQ Mixer

***New Release**

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MIXERS, Double Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	ECCN
MM1-0115HS	1-15	DC-2.5	7.5	+21	+17	EAR99
MM1-0212(L/H/S)S	2-12	DC-3	8/8.5/8.5	+13/+23/+26	+9/+15/+20	EAR99
MM1-0222(L/H)S	2-22	DC-3.5	8.5	+11.5/+20	+9/+15	EAR99
MM1-0312(H/S)S	3-12	DC-4.5	7.5	+19/+24	+15/+20	EAR99
MM1-0320(L/H)S	3-20	DC-4	8	+10/+20	+7/+15	EAR99
MM1-0330(H/T)S	3-30	DC-5	7/9	+21/+32	+19/+23	EAR99
MM1-0424SS	4.5-24	DC-4	8	+25	+20	EAR99
MM1-0626(H/S)S	6-26.5	DC-9	7.5/8	+21/+25	+15/+20	EAR99
MM1-0832(L/H)S	8-32	DC-12	8/7.6	+14/+23	+9/+15	EAR99
MM1-1044(L/H)S	10-44	DC-14	7.6	+13/+22	+9/+15	EAR99
MM1-1140HS	11-40	DC-12	8	+21	+15	EAR99
MM1-1240SS	12-40	DC-12	8	+25	+20	EAR99
MM1-1467(L/H)S	14-67	DC-21	7	+12/+17.5	+11/+15	EAR99
MM1-1850(H/S)S	18-50	DC-20	8/8.5	+21/+25	+15/+20	EAR99
MM1-1857(L/H)S	18-57	DC-21	8/7.5	+13/+20	+9/+13	EAR99
MM1-2567LS	25-67	DC-30	9	+9	+13	EAR99
MM1-30100LM	30-100	DC-20	8.5	see datasheet	+14	EAR99
MMH-35120HM[1]	35-120, 12-40	DC-14	18	+7	+15	3A001.b.7.c.1

[1]Harmonic Mixer

MIXERS, Triple Balanced

Part Number	RF/LO (GHz)	IF (GHz)	Conversion Loss (dB)	IIP3 (dBm)	LO Drive (dBm)	ECCN
MT3A-0113HPA[1]	1-13	0.5-8.5	9.5	+28	+12	EAR99
MT3L-0113HS	1.5-13	0.25-5	8.5	+31	+20	EAR99
MT3H-0113(L/H)S	1.5-13	0.8-8.5	8/8.5	+20/+28	+15/+20	EAR99
T3-18GLS	0.01-18	0.001-10	7.5	+25	+20	EAR99
T3H-18GLS	0.01-18	0.01-18	9.5	+30	+20	EAR99
T3-20GLS	0.01-20	0.001-10	7.5	+30	+20	EAR99
T3H-20G(L/I)S	0.01-20	0.01-20	9.5	+30	+20	EAR99
T3-0838GLN	8-38	0.01-10	8	+30	+20	EAR99
T3-1040GLN	10-40	1-18	8	+25	+20	EAR99
MM2-0530(L/H)S	5-30	2-20	10/9	+15/+21	+15/+20	EAR99

[1]Integrated low phase noise driver amplifier

PASSIVE MULTIPLIERS & NON LINEAR TRANSMISSION LINES

Part Number	Type	Input (GHz)	Output (GHz)	1F Suppression (dBc)	3F Suppression (dBc)	ECCN
MMD-0415HS	Doubler	2-7.5	4-15	27	36	EAR99
MMD-1030(L/H)S	Doubler	5-15	10-30	38/41	46/51	EAR99
MMD-1250HU	Doubler	6-25	12-50	32	40	EAR99
MMD-1648LS	Doubler	8-24	16-48	44	69	EAR99
MMD-2060(L/H)U	Doubler	10-30	20-60	37/38	41/40	EAR99
MMD-20100HM	Doubler	10-50	20-100	24.5	33	3A001.b.7.b.1
MMD-3567LU	Doubler	17.5-33.5	35-67	38	44	EAR99
MMD-3580LU-KW	Doubler	17.5-40	35-80	38	44	EAR99
MMD-40120HM	Doubler	20-60	40-120	30	40	3A001.b.7.b.1
MMQ-40125HM	Quadrupler	10-31.25	40-125	19	12	3A001.b.7.b.1
NLTL-6273S	Comb Generator	0.7-5	0.7-40	–	–	EAR99
NLTL-6275U/USW	Comb Generator	3-15	3-85	–	–	EAR99

ACTIVE MULTIPLIERS

Part Number	Input (GHz)	Output (GHz)	Input (dBm)	Output (dBm)	ECCN
ADA-0416	2-8	4-16	0 to +6	+16	EAR99
ADA-1030	5-15	10-30	0 to +6	+16	EAR99
AQA-2156	5.25-14	21-56	-2 to +6	+20	EAR99
ADA-2052	10-26	20-52	-6 to +2	+16	EAR99

POWER DIVIDERS, High Isolation

Part Number	Band (GHz)	Loss (dB)	Amplitude Balance (dB)	Isolation (dB)	ECCN
PBR-0003	.0003-3	1.25	±0.4	45	EAR99
PBR-0006	.0003-6	1.5	±0.5	40	EAR99
PBR-0012	.0003-12	1.5	±0.6	35	EAR99

POWER DIVIDERS, Wilkinson 1:2

Part Number	Band (GHz)	Loss (dB)	Amplitude Balance (dB)	Phase Balance (°)	Isolation (dB)	ECCN
PD-0R413	0.4-13.2	1	±0.05	±1	24	EAR99
PD-0R426	0.4-26	2	±0.05	±2	24	EAR99
PD-0R510	0.5-10	0.9	±0.1	±1	22	EAR99
PD-0R618	0.6-18	1	±0.05	±1	22	EAR99
PD-0R636	0.6-36	2	±0.1	±3	22	EAR99
PD-0109	1-9	0.75	±0.1	±1	22	EAR99
PD-0126	1-26	1	±0.1	±3	20	EAR99
PD-0140	1-40	1.5	±0.2	±2	20	EAR99
PD-0150	1-50	2	±0.25	±3	20	EAR99
PD-0165	1-65	5	±0.25	±3	20	EAR99
PD-0218	2-18	1	±0.2	±2	22	EAR99
PD-0220	2-20	1	±0.2	±2	22	EAR99
PD-0426	4-26.5	0.8	±0.2	±2	18	EAR99
PD-0440	4-40	1	±0.2	±3	18	EAR99
PD-0450	4-50	1.2	±0.5	±5	18	EAR99
PD-0465	4-65	2	±0.5	±5	18	EAR99
MPDW-10110M2	10-110	3	±0.25	±3	22	EAR99

POWER DIVIDERS, Wilkinson 1:3

Part Number	Band (GHz)	Loss (dB)	Amplitude Balance (dB)	Phase Balance (°)	Isolation (dB)	ECCN
PD3-0R412	0.4-12	1.5	±0.1	±2	23	EAR99
PD3-0R616	0.6-16	1.5	±0.1	±2	24	EAR99
PD3-0126	1.5-26.5	1.5	±0.3	±4	24	EAR99

POWER DIVIDERS, Wilkinson 1:4

Part Number	Band (GHz)	Loss (dB)	Amplitude Balance (dB)	Phase Balance (°)	Isolation (dB)	ECCN
PD4-0R518	0.5-18	1.5	±0.25	±3	20	EAR99
PD4-0R526	0.5-26.5	2.5	±0.25	±3	19	EAR99
PD4-0R532	0.5-32	2.5	±0.3	±4	19	EAR99
PD4-0120	1-20	1.5	±0.25	±3	20	EAR99
PD4-0126	1-26.5	1.5	±0.3	±3	20	EAR99
PD4-0140	1-40	2.5	±0.4	±4	19	EAR99
PD4-0150	1-50	4	±0.5	±5	20	EAR99
PD4-0218	2-18	1.2	±0.2	±2	20	EAR99

POWER DIVIDERS, Resistive 1:2

Part Number	Band (GHz)	Loss (dB)	Amplitude Balance (dB)	Phase Balance (°)	ECCN
PD-0010	DC-10	0.25	±0.1	±1	EAR99
PD-0020	DC-20	0.5	±0.2	±2	EAR99
PD-0030	DC-30	0.5	±0.25	±2	EAR99
PD-0040	DC-40	0.75	±0.25	±2	EAR99
MPDR-00110M2	DC-110	1.5	±0.25	±7.5	EAR99

ADAPTERS, High Performance

Part Number	Band (GHz)	Loss (dB)	VSWR	Description	ECCN
ADP-2429	DC-40	0.3	1.2	2.4(M/F) to 2.92(M/F)	EAR99
ADP-29	DC-40	0.3	1.2	2.92(M/F) to 2.92(M/F)	EAR99
ADP-24	DC-50	0.5	1.3	2.4(M/F) to 2.4(M/F)	EAR99
RA40	DC-40	0.3	1.4	2.92M to 2.92F	EAR99
RA50	DC-50	0.3	1.4	2.92M to 2.92F	EAR99

ATTENUATORS, Precision-Grade

Part Number	Band (GHz)	Attenuation (dB)	Accuracy (dB)	Return Loss (dB)	ECCN
ATN06-0067(-2HV/-3HV)	DC-67	6.4	see datasheet	23	EAR99
ATN10-0067(-2HV/-3HV)	DC-67	10.5	see datasheet	22	EAR99
ATN06-00110(-2W/-3W)	DC-110	6.5	see datasheet	20	EAR99
ATN10-00110(-2W/-3W)	DC-110	10.5	see datasheet	20	EAR99

DC BLOCKS, Broadband

Part Number	Band (GHz)	Loss (dB)	DC Voltage (V)	Rise Time (ps)	Group Delay (ps)	ECCN
DCZ(M-F)29(M-F)29	.000004-40	0.7	16	6	75	EAR99
DCZ(M-F)24(M-F)24	.000004-50	0.7	16	6	75	EAR99

LIMITERS

Part Number	Band (GHz)	Loss (dB)	Flat Leakage (dBm)	Peak Power CW (W)	Peak Power Pulsed (W)	P1dB (dBm)	ECCN
HLM-8011U	DC-30	0.8	+7@30GHz	1	4.5	+10	EAR99
HLM-40U	DC-40	1	+16@20GHz	4	20	15	EAR99

TERMINATIONS

Part Number	Band (GHz)	Impedance (Ω)	Return Loss (dB)	ECCN
T(M/F)50-110M	DC-110	50	15	EAR99

THUMBWHEEL

Part Number	Description	ECCN
TW-1	quick, secure, wrenchless connection for SMA, 2.92mm and 2.4mm	EAR99

***New Release**

All electrical specifications given are typical values.

Visit markimicrowave.com for more connectorized components.

MARKI MICROWAVE PART NUMBER DECODER RING

Example: MT3H-0113LCQG-2
Prefix=MT3H, Identifier=0113, Diode=L, Package=CQG, Suffix=-2

PREFIX

1 to 4 letters to identify the product category (**BAL**=balun, **PD**=power divider, etc)

- MMICs: M prefix (ex: **M**BAL, **M**M1, **M**T3)
- Modifiers: ex: MT3**A** Integrated LO Driver Amplifier
- EVAL, EVB: evaluation boards of SMT components (ex: **EVAL**-MM1-0212H)

IDENTIFIER

Most part numbers include a 4-digit string that identifies start/stop frequencies (ex: **0416** = 4 to 16 GHz), with a few exceptions:

- Exceptions: amplifiers and NLTLs have the chip number instead of frequency band

DIODE

Found on mixers, IQ mixers and multipliers. LO Drive is given at typical value.

- **L** diode: Vf=0.25V, LO Drive +5 to +15 dBm
- **H** diode: Vf=0.75V, LO Drive +11 to +20 dBm
- **S** diode: Vf=1.4V, LO Drive +17 to +23 dBm
- **T** diode: Vf=2V, LO Drive +20 to +27 dBm

PACKAGES

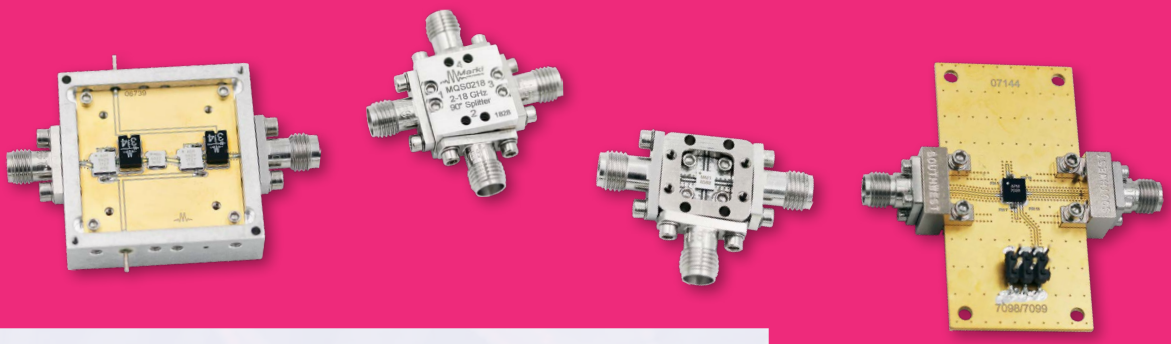
- MMIC SMTs: **SM** (surface mount), **PSM** (plastic substrate), **CSM** (ceramic substrate), **CSP1** (chip scale package), **LGA** (land grid array) or **CH** (chip/bare die)
- Hybrid surface mounts: **CTG**, **CQG**, **SM**, **SMG**, **SLG**, **SSG**, etc
- Connectorized
  - Sub-30GHz MMIC: typically **S**
  - mmWave modules: **M**, **M2**, **U**, **UA**, **UB**, **UC**, etc
- Evaluation boards: **EVAL**, **EVB**

LAYOUT CONFIGURATION

- Mixers are generally offered in **-2** layout, but some are offered in a mirrored layout **-1** (ex: MM1-1467LCH**-1** and MM1-1467LCH**-2**)

CONNECTOR OPTIONS: swaps are available upon request

- SMA
- 2.92 mm
- 2.4 mm
- 1.85 mm
- 1 mm



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