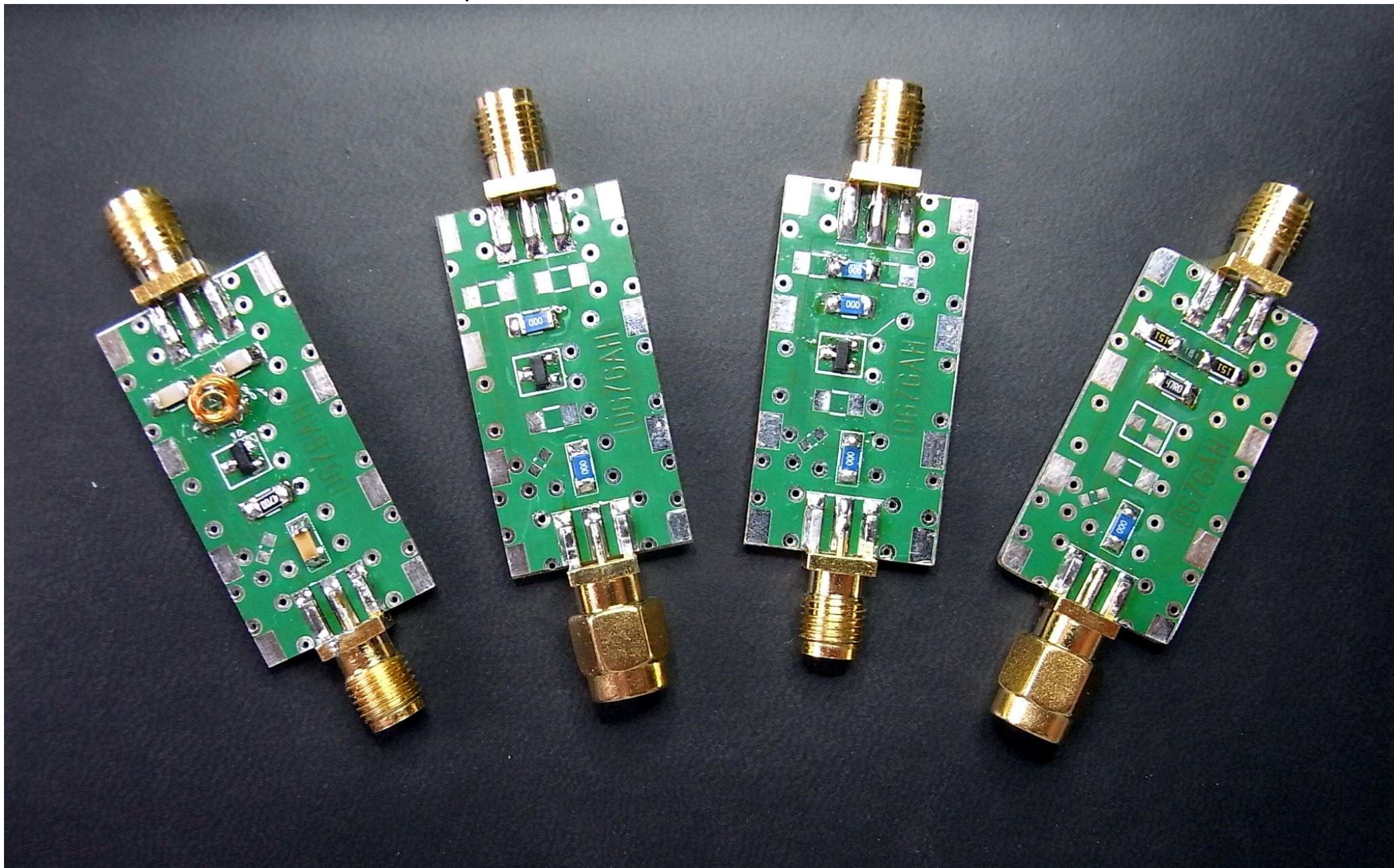
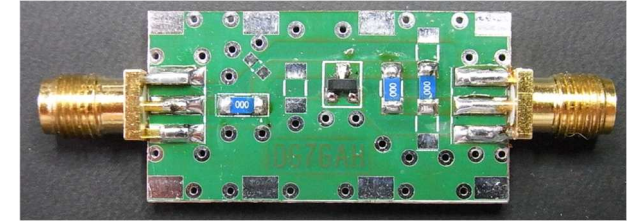
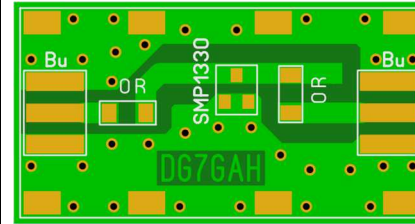
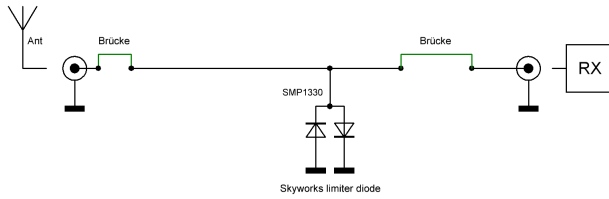


Limiter mit SMP1330 auf Uni-Leiterplatte

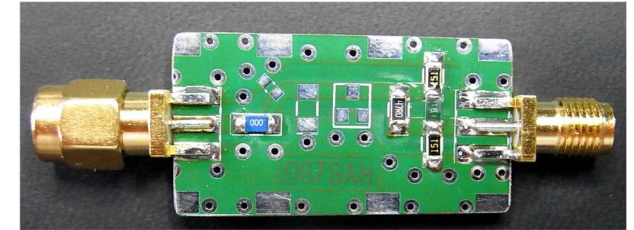
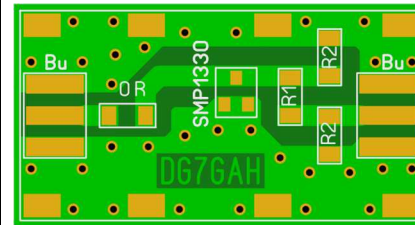
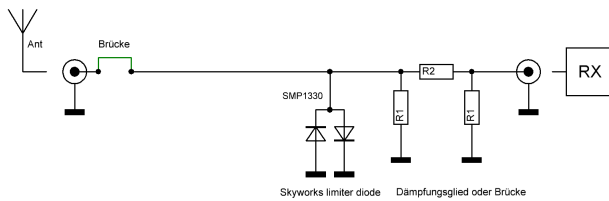


## 4 Beispiele, unterschiedliche Bestückung:

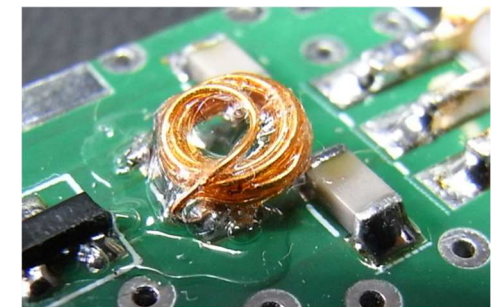
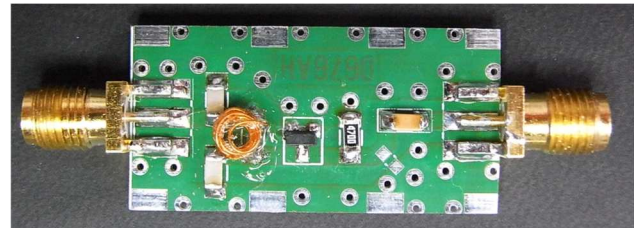
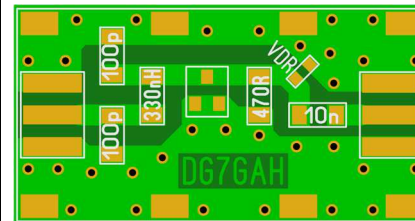
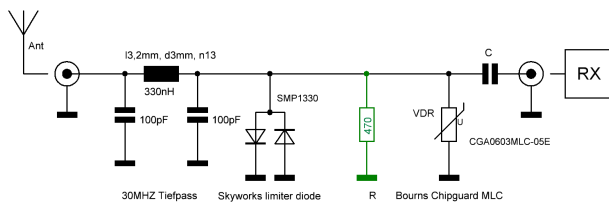
1)  
breitbandiger Limiter



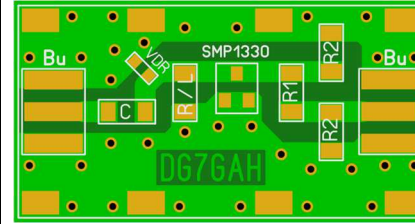
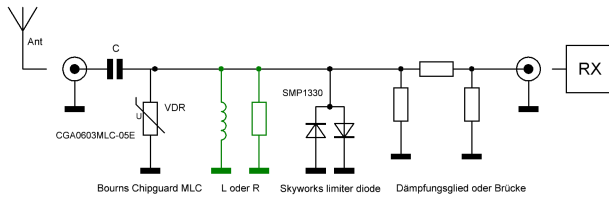
2)  
Dämpfungsglied  
mit oder ohne  
Limiter



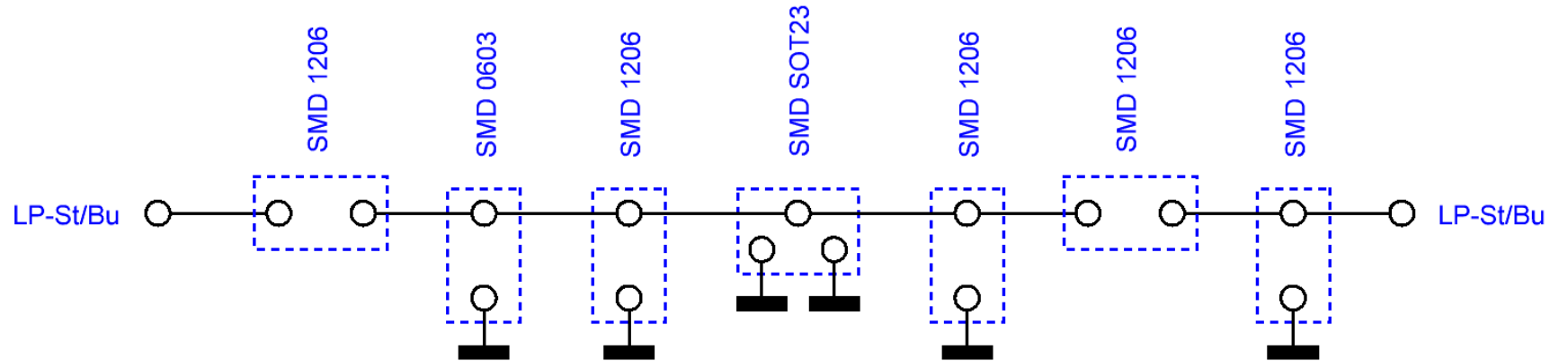
3)  
30MHZ Tiefpass,  
Limiter,  
ESD-Schutz,  
DC-Block



4)  
DC-Block,  
ESD-Schutz,  
Limiter,  
Dämpfungsglied



LP-Schema



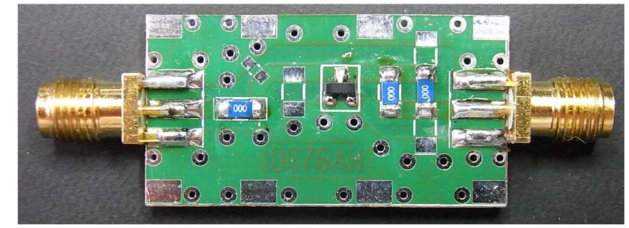
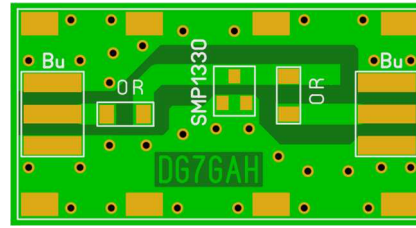
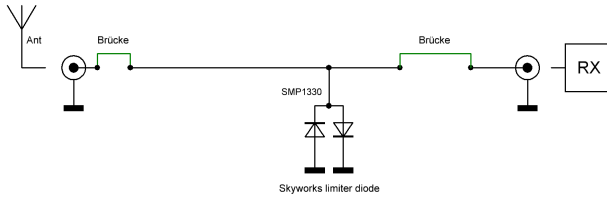
Bauteile im gängigen Handel

SMP1330	1,05 - 1,20
LP	0,80 - 0,90 (im Mehrfachnutzen)
SMA Bu	0,35 - 0,40
SMA ST	0,35 - 0,40
<b>zus. ca.</b>	<b>2,50-3,00</b>

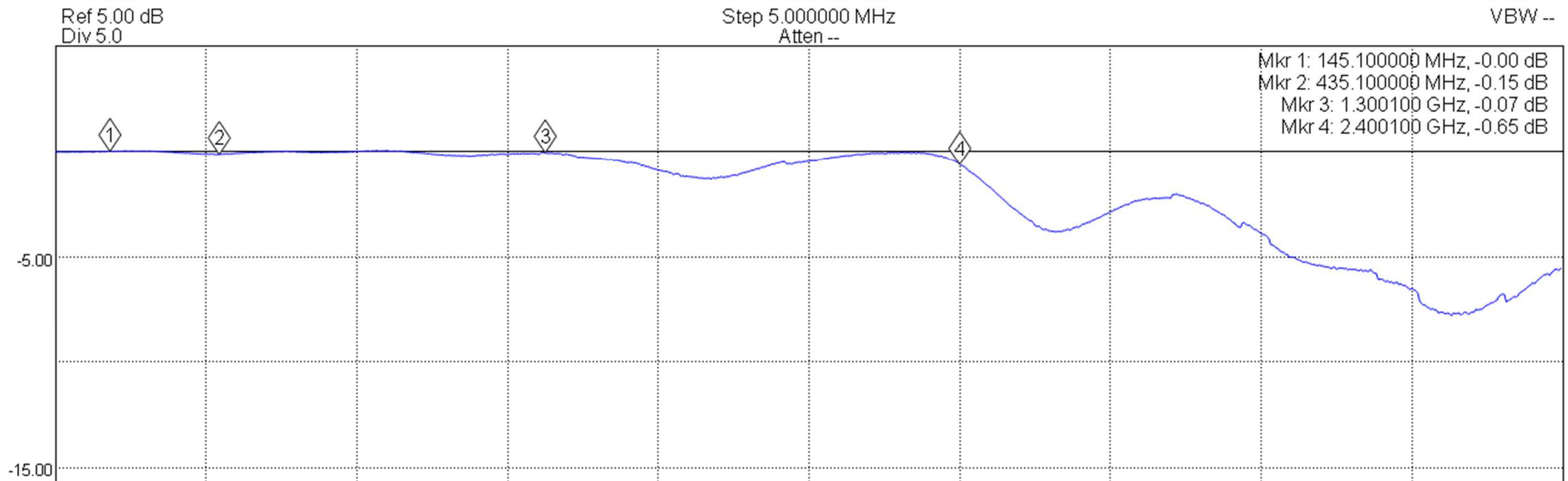
# Messungen

(Ref. SMA-Bu-Bu Kupplung)

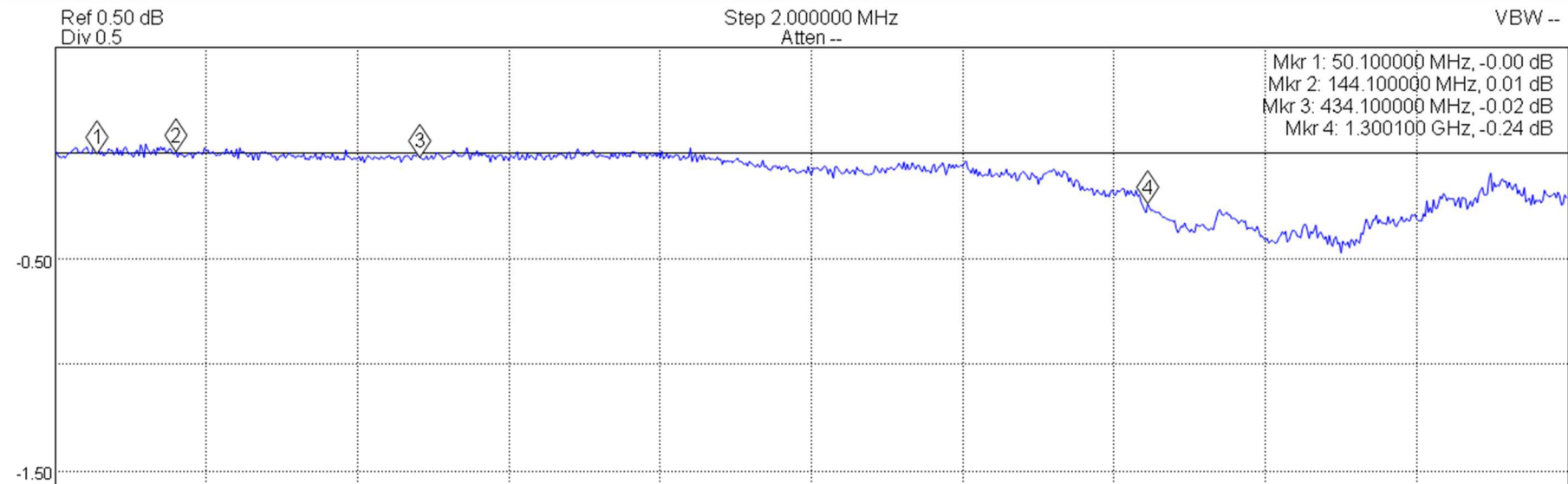
zu 1)  
breitbandiger  
Limiter



100kHz-4GHz

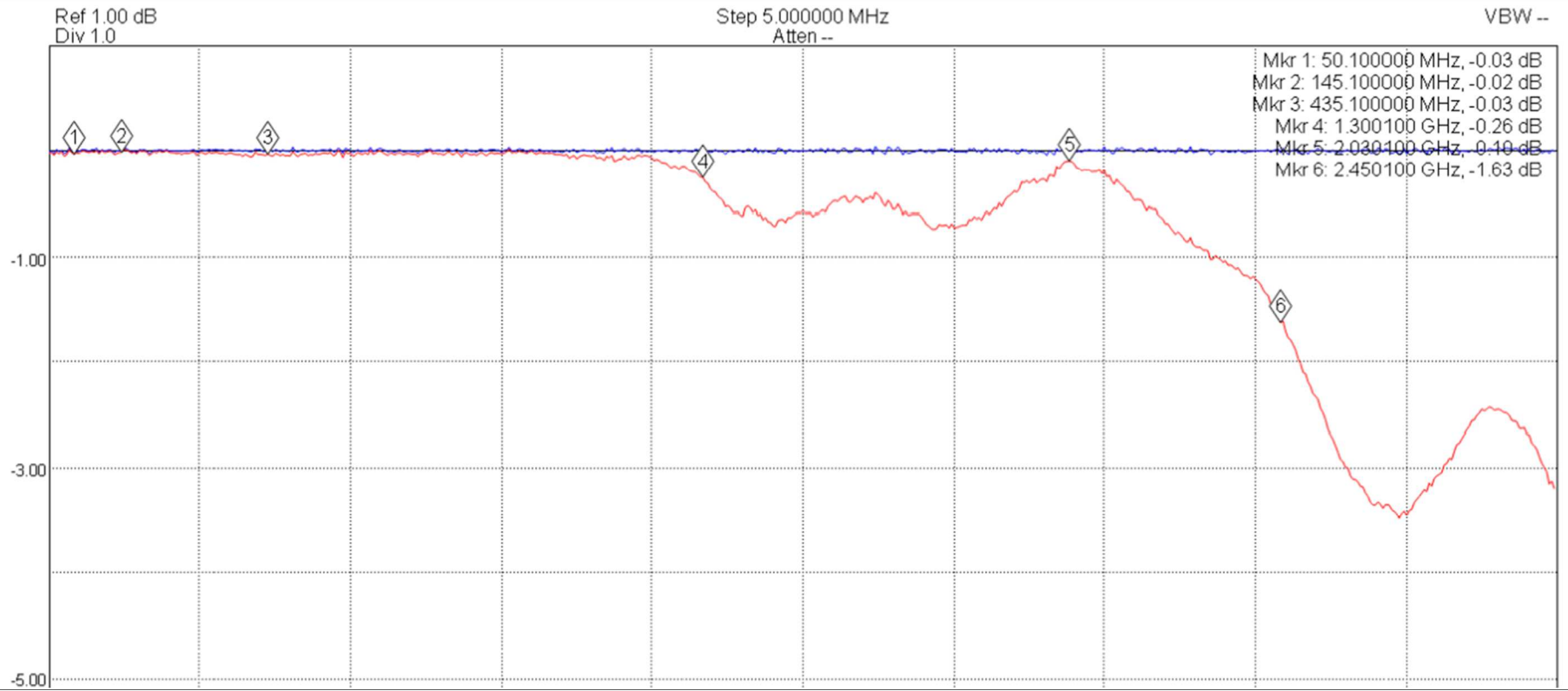


100kHz-1,8GHz

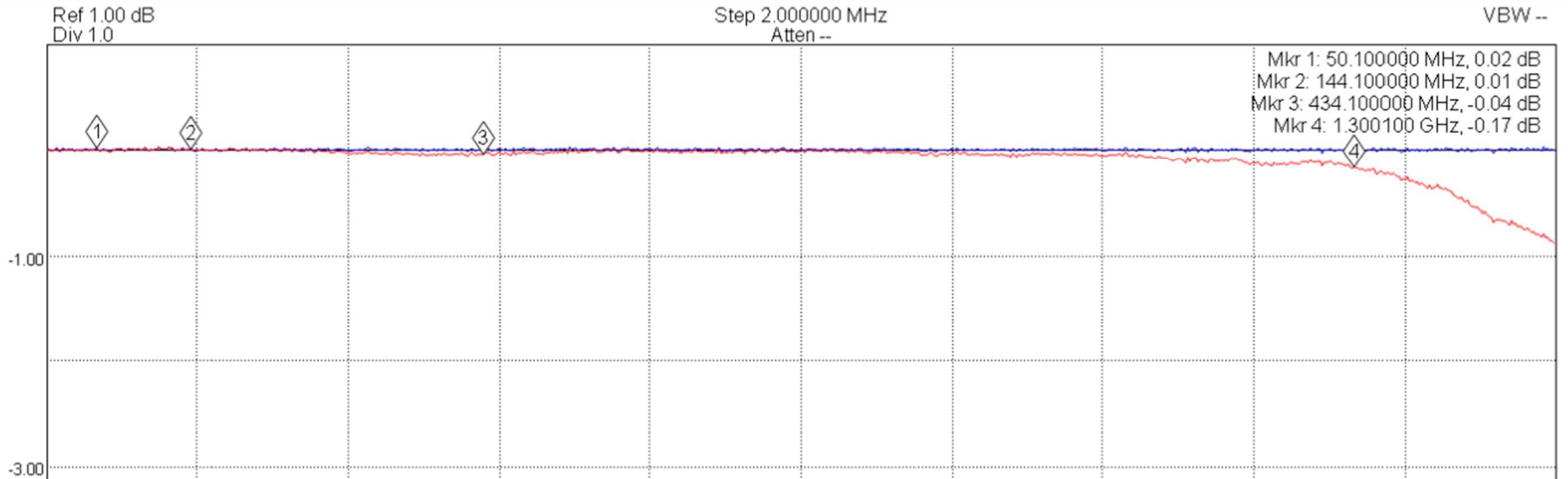


breitbandiger  
Limiter

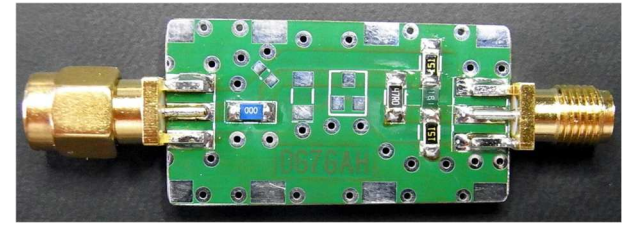
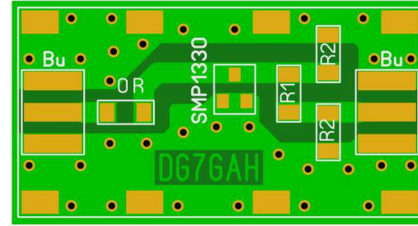
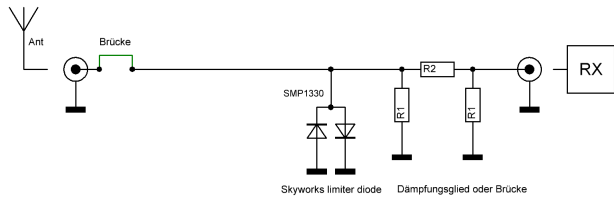
zweiter Test/Modul  
100kHz-3GHz



zweiterTest/Modul  
100kHz-1,5kHz

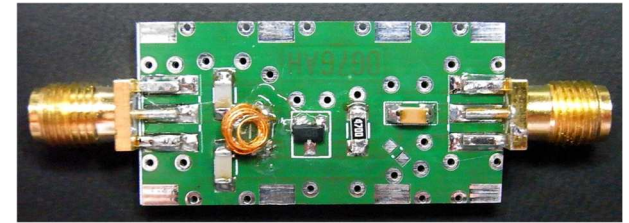
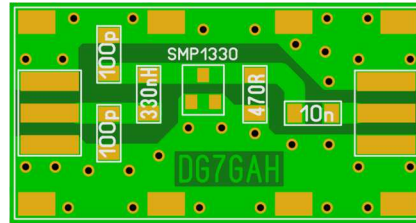
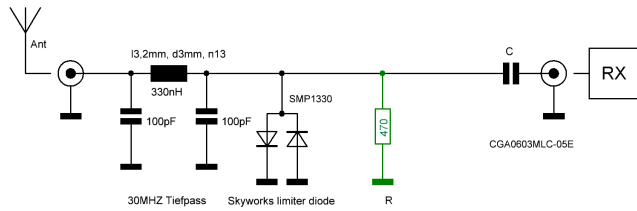


zu 2)  
Dämpfungsglied

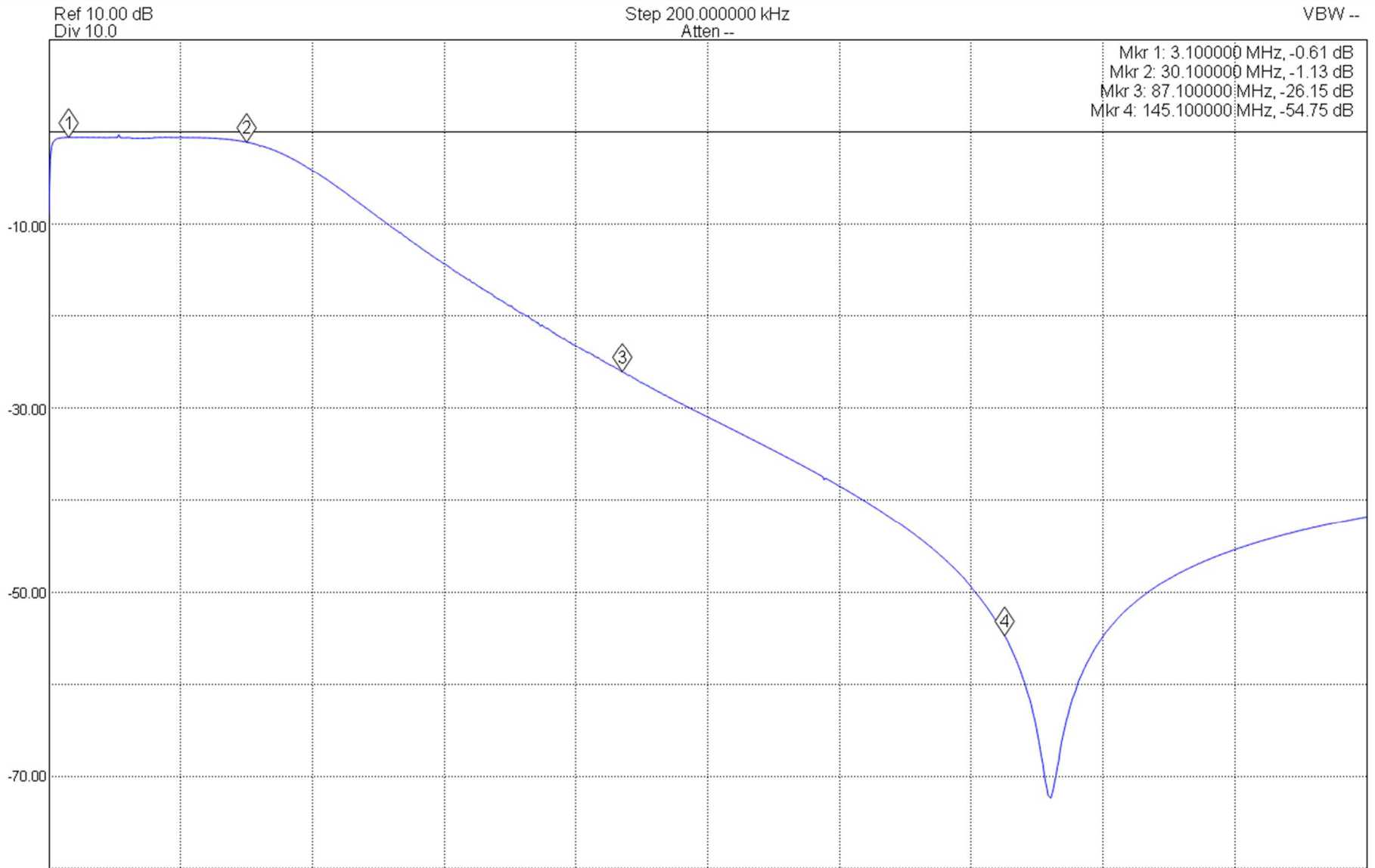


Dämpfungsglied

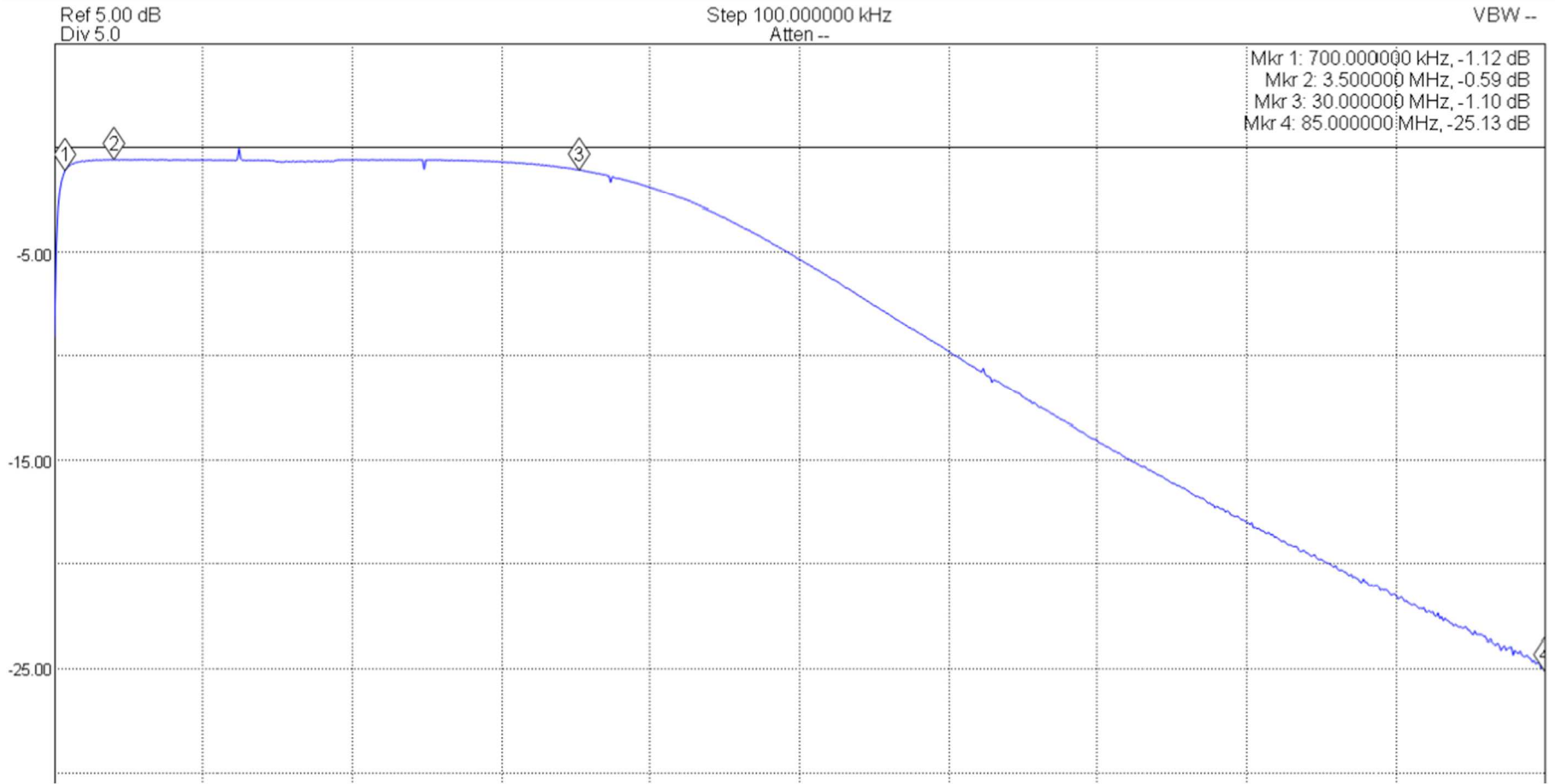
zu 3)  
 30MHz Tiefpass,  
 Limiter,  
 DC-Block  
 (ohne VDR)



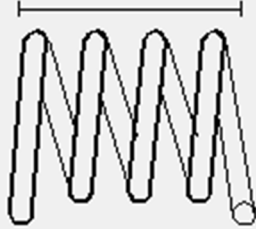
100kHz-200MHz



100kHz-85MHz



Length



Length  mm

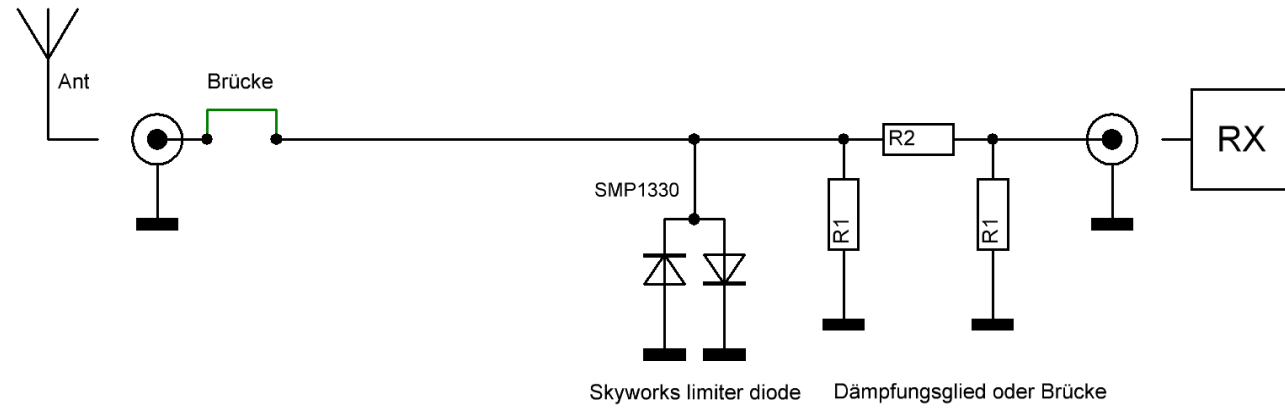
Diameter  mm

Number of turns

L=



Intermodulation und  
Amplitudenbegrenzung  
des SMP1330



Intermodulation 145MHz,  
kritische Eingangsleistung

Intermodulation 433MHz,  
kritische Eingangsleistung

Einsatz Amplitudenbegrenzung NF/30MHz/145MHz

## DATA SHEET

# SMP1330 Series: Plastic Packaged Limiter Diodes

### Applications

- WLAN, WiMAX
- Cellular infrastructure
- RFID readers
- Test instruments

### Features

- Low-distortion design
- Limiter performance to 4 GHz and higher
- Low insertion loss
- Low-cost plastic package
- Packages rated MSL1 @ 260 °C per JEDEC J-STD-020



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.



### Description

The SMP1330 series of limiter diodes is designed for use as passive receiver protectors in wireless and other RF systems covering frequencies up to 4 GHz and higher. These diodes use Skyworks limiter diode technology to produce gold-doped, thin base limiters for low-loss, low-distortion performance and good limiter action.



The SMP1330 series of diodes has been characterized in limiter circuits and tightly specified to ensure consistent performance.

**Table 1. SMP1330 Series Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	$V_R$		20	V
Forward current	$I_F$		100	mA
CW incident power @ 25 °C lead temperature			1	W
Peak incident power @ 1% duty factor, 1 $\mu$ s pulse			100	W
Power dissipation @ 25 °C lead temperature	$P_D$		250	mW
Storage temperature	$T_{STG}$	-65	+150	°C
Operating temperature	$T_A$	-65	+150	°C

<sup>1</sup> Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value.

**Table 2. Part Number and Configuration**

	
Series Pair	Single
SOT-23	SOD-882
<b>SMP1330-005LF</b> Green™ Marking: RQ2	<b>SMP1330-040LF</b> Green™ Marking: F
L <sub>s</sub> = 1.5 nH	L <sub>s</sub> = 0.45 nH



The Pb-free symbol or "LF" in the part number denotes a lead-free, RoHS-compliant package unless otherwise noted as Green™. Tin/lead (Sn/Pb) packaging is not recommended for new designs.

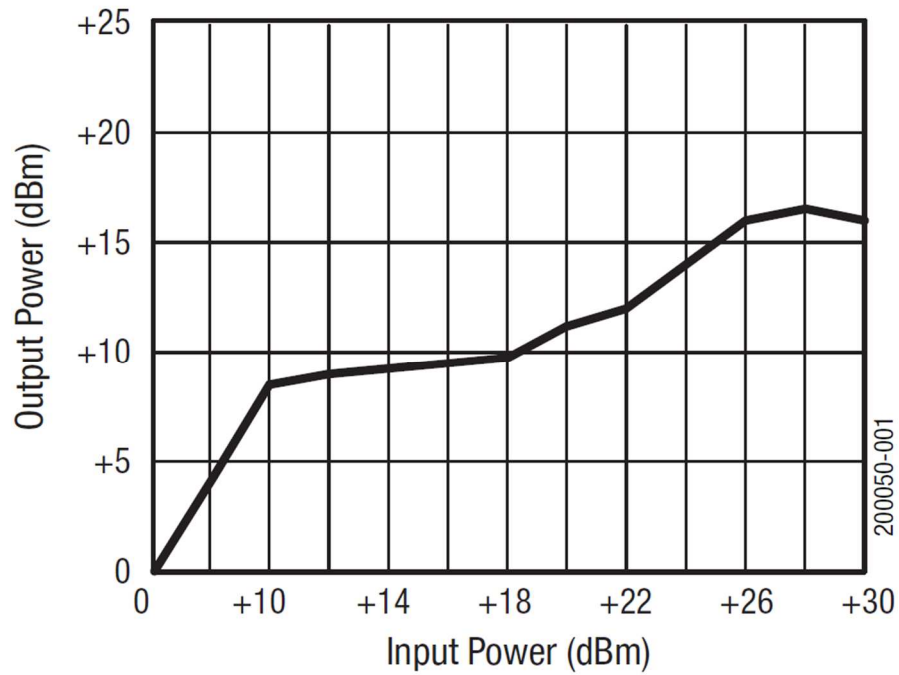
**Table 3. SMP1330 Series Electrical Specifications<sup>1</sup>**  
**(T<sub>A</sub> = +25 °C Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Series resistance	R <sub>s</sub>	F = 100 MHz, I <sub>F</sub> = 10 mA		1.2	1.5	Ω
Capacitance	C <sub>T</sub>	0 V F = 1 MHz F = 1 GHz		0.7 0.7	1.0	pF pF
Capacitance ratio	C <sub>TR</sub>	C <sub>T</sub> @ 0 V/C <sub>T</sub> @ 6 V			1.22	–
Conductance	G	0 V, F = 1 GHz		50		μs
Carrier lifetime	T <sub>I</sub>	I <sub>F</sub> = 10 mA		4		ns
I region width				2		μm
Breakdown voltage	V <sub>B</sub>	I <sub>R</sub> = 10 μA	20	35	50	V

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 4. Typical 1 GHz Limiter Performance**

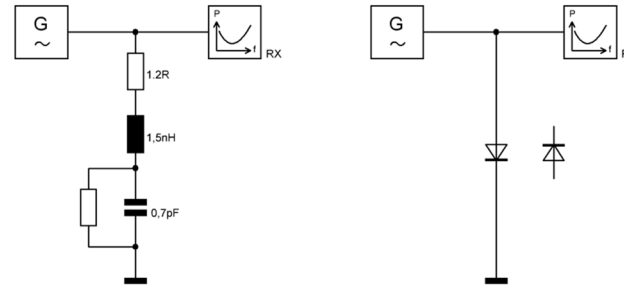
Parameter	SMP1330-005	Condition
Connection	Parallel	
Insertion loss	0.3 dB	Input power = –20 dBm
IP3	+30 dBm	Input power = < 0 dBm
1 dB compression	+10 dBm	
Attenuation @ +20 dBm	8.8 dB	
Attenuation @ +30 dBm	14 dB	



**Figure 1. Typical 1 GHz Limiter Performance**

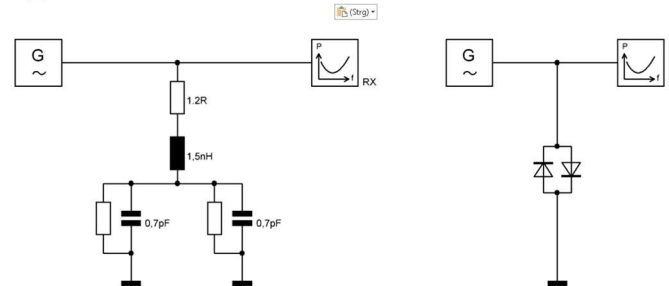
SMP1330 Ersatzschaltungen

Einzeldiode SMP1330-005LF



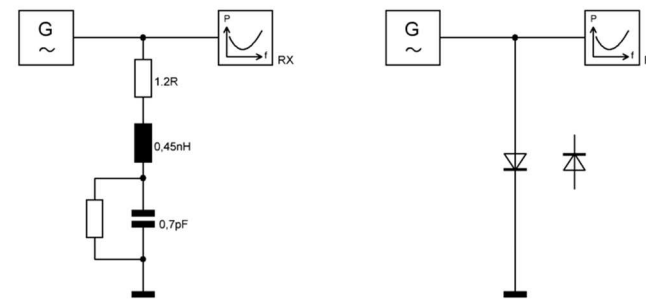
Series Pair
SOT-23
<b>SMP1330-005LF</b>
Green™
Marking: RQ2
L <sub>S</sub> = 1.5 nH

Doppeldiode SMP1330-005LF



Series Pair
SOT-23
<b>SMP1330-005LF</b>
Green™
Marking: RQ2
L <sub>S</sub> = 1.5 nH

Einzeldiode SMP1330-040LF



Single
SOD-882
<b>SMP1330-040LF</b>
Green™
Marking: F
L <sub>S</sub> = 0.45 nH

Bourns® ChipGuard® Automotive MLC Series is a sub-1 pF protector designed specifically for use in circuits requiring ESD protection. The CGA-MLC series is available in industry standard 0402 and 0603 packages. In addition to its very low capacitance, these protectors exhibit extremely fast response times to ESD events making them ideal for protecting a wide array of high speed digital electronic applications.



The ChipGuard® MLC Series is fully AEC-Q200 compliant and supported.

**Electrical Characteristics @ 25 °C (unless otherwise noted)**

Parameter	Symbol	CGA0402MLC-			CGA0603MLC-			Unit
		05G	12G	24G	05E	12E	24E	
DC Working Voltage	V <sub>W(DC)</sub>	≤5	≤12	≤24	≤5	≤12	≤24	V
Maximum Leakage Current @ Max. V <sub>W(DC)</sub>	I <sub>L</sub>	<0.01						μA
Typical Clamping Voltage (Note 1)	V <sub>C</sub>	30						V
Typical Trigger Voltage (Note 1)	V <sub>T</sub>	300						V
Typical Peak Voltage (Note 2)	V <sub>P</sub>	300						V
Typical Capacitance @ 1 MHz, 1 Vrms	C <sub>O</sub>	0.2						pF
Response Time	R <sub>T</sub>	<1						ns
ESD Protection: Per IEC 61000-4-2 Level 4 Min. Contact Discharge Min. Air Discharge Typical ESD Withstand		±8 ±15 (Note 3) 1000						kV kV Pulses
Operating Temperature	T <sub>OPR</sub>	-55 to +125						°C
Storage Temperature	T <sub>STG</sub>	-55 to +125						°C

- Notes: 1. V<sub>T</sub> and V<sub>C</sub> measured using TLP (Transmission Line Pulse) method.  
2. Peak voltage measured under ESD Test Conditions: IEC61000-4-2, 8 kV contact discharge.  
3. IEC 61000-4-2 ESD Performance for CGA0603MLC-05E and CGA0603MLC-12E devices will meet minimum 100 reps. Some shifting in characteristics may occur when tested over several hundred ESD pulses. All other part numbers listed will meet IEC 61000-4-2 ESD Performance with minimum 1000 reps without degradation in performance.