

Test Result and Measuring equipment for certification

Millimeter-Wave Radar (76.5 GHz band)

Radio Equipment for test	Model or type name: MAR120	Test environment	Temperature : 23.3 °C	Test Method: TELEC-T306(Rev.3.1)	F0N, 76.5 GHz, 1 channel(long range)	0.0025 mW
	Humidity : 52.4 %					
	Serial number: 50BJC00044	Engineer: H.G.KIM Reviewer: Y.H.LEE Date: MAR.02.2020 ~ MAR.09.2020 Test location: HCT				

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(FSV40-N)	101068-SZ	Rohde&Schwarz	2019-09-26	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Spectrum Analyzer(FSV)	101436	Rohde&Schwarz	2019-03-21	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Spectrum Analyzer(FSW)	101256	Rohde&Schwarz	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Hybrid Antenna(VULB 9168)	3368	Schwarzbeck	2018-08-09	KTL	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(BBHA 9120D)	9120D-1298	Schwarzbeck	2019-09-25	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(BBHA 9170)	BBHA9170124	Schwarzbeck	2019-01-28	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M19RH)	M19RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M12RH)	M12RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M08RH)	M08RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M05RH)	M05RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	WR-19 HARMONIC MIXER(OML WR19)	M19HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	WR-12 HARMONIC MIXER(OML WR12)	M12HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	WR-08 HARMONIC MIXER(OML WR08)	M08HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	WR-05 HARMONIC MIXER(OML WR05)	M05HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Amplifier(TK-PA1840H)	170011-L	TESTEK	2019-11-13	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Amplifier(CBLU1183540B-01)	25539	CERNEX	2020-01-21	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Vibration Testing System(G-210N)	SG-4788	Shinken Co.,Ltd	2019-07-03	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Temp & Humidity Chamber(KR-1005L)	KRAC05063-3	Korea Engineering	2019-11-07	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Signal Generator(SMF100A)	105078	Rohde&Schwarz	2019-06-19	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S19MS-A)	160516-1	OML INC.	2019-11-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S12MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S08MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S05MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Voltage			Unit	Limit	DC 10.80 V (low)	DC 12.00 V (normal)	DC 13.20 V (high)	Note
	Test Frequency			GHz		76.48	76.48	76.48	
	Frequency tolerance(OBW lower frequency)			GHz	76.0	76.3664	76.3661	76.3658	
	Frequency tolerance(OBW Upper frequency)			GHz	77.0	76.6029	76.6024	76.6021	
	Occupied bandwidth			MHz	1000	239.16	239.20	239.18	
	Spurious emission	(measured frequency)		GHz	-	18.00	18.00	18.00	
		spurious domain		μ W	50	0.3801	0.3868	0.3788	
	Unwanted emission	(measured frequency)		GHz	-	74.25	74.24	74.24	
		out of-of-band domain		μ W	100	24.44	24.52	24.31	
	Antenna power ^(Note.1)			mW	2.50	2.82	2.88	2.86	
	deviation			%	-70 50	12.8	15.2	14.4	
	Environmental test	-20 ℃	OBW lower frequency	GHz	76.0	76.3676	76.3685	76.3671	
			OBW Upper frequency	GHz	77.0	76.6041	76.6048	76.6055	
		60 ℃	OBW lower frequency	GHz	76.0	76.3666	76.3661	76.3660	
			OBW Upper frequency	GHz	77.0	76.6051	76.6017	76.6018	
		35 ℃ / 95 % R.H.	OBW lower frequency	GHz	76.0	76.3665	76.3674	76.3670	
			OBW Upper frequency	GHz	77.0	76.6015	76.6024	76.6021	
		Vibration	OBW lower frequency	GHz	76.0	76.3660	76.3662	76.3658	
			OBW Upper frequency	GHz	77.0	76.6038	76.6043	76.6037	
Antenna gain			dB	40 or less	14.08				

Note1. Antenna power(calculated value) = mesured EIRP value - Antenna gain

Test Result and Measuring equipment for certification

Millimeter-Wave Radar (76.5 GHz band)

Radio Equipment for test	Model or type name: MAR120	Test environment	Temperature : 23.3 °C	Test Method: TELEC-T306(Rev.3.1)	F0N, 76.5 GHz, 1 channel(short range)	0.0025 mW
	Humidity : 52.4 %					
	Serial number: 50BJC00018	Engineer: H.G.KIM Reviewer: Y.H.LEE Date: MAR.02.2020 ~ MAR.09.2020 Test location: HCT				

Equipment	Model and type name	Serial number	Manufacturer	Last Calibrated date	Calibration Company	Note
	Signal Analyzer(FSV40-N)	101068-SZ	Rohde&Schwarz	2019-09-26	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Spectrum Analyzer(FSV)	101436	Rohde&Schwarz	2019-03-21	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Spectrum Analyzer(FSW)	101256	Rohde&Schwarz	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	DC Power Supply(E3632A)	KR75306225	AGILENT Technologies	2019-04-11	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Hybrid Antenna(VULB 9168)	3368	Schwarzbeck	2018-08-09	KTL	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(BBHA 9120D)	9120D-1298	Schwarzbeck	2019-09-25	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(BBHA 9170)	BBHA9170124	Schwarzbeck	2019-01-28	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M19RH)	M19RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M12RH)	M12RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M08RH)	M08RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	Horn Antenna(M05RH)	M05RH-18042301	OML INC	2018-04-23	OML INC	Based on Japanese Radio Law 24-2-4-2-ha
	WR-19 HARMONIC MIXER(OML WR19)	M19HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
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	WR-08 HARMONIC MIXER(OML WR08)	M08HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	WR-05 HARMONIC MIXER(OML WR05)	M05HWD	OML INC	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Amplifier(TK-PA1840H)	170011-L	TESTEK	2019-11-13	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Power Amplifier(CBLU1183540B-01)	25539	CERNEX	2020-01-21	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Vibration Testing System(G-210N)	SG-4788	Shinken Co.,Ltd	2019-07-03	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Temp & Humidity Chamber(KR-1005L)	KRAC05063-3	Korea Engineering	2019-11-07	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
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	Millimeter Wave Source Module(S12MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S08MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha
	Millimeter Wave Source Module(S05MS-A)	160419-1	OML INC.	2019-09-09	HCT Co., Ltd.	Based on Japanese Radio Law 24-2-4-2-ha

Test result	Electric performance	Voltage		Unit	Limit	DC 10.80 V (low)	DC 12.00 V (normal)	DC 13.20 V (high)	Note	
		Test Frequency		GHz		76.460	76.460	76.460		
		Frequency tolerance(OBW lower frequency)		GHz	76.0	76.0316	76.0320	76.0325		
		Frequency tolerance(OBW Upper frequency)		GHz	77.0	76.8849	76.8852	76.8859		
		Occupied bandwidth		MHz	1000	853.27	853.14	853.34		
		Spurious emission	(measured frequency)	GHz	-	18.00	18.00	18.00		
			spurious domain	μW	50	0.4766	0.4827	0.4816		
		Unwanted emission	(measured frequency)	GHz	-	74.23	74.23	74.24		
			out-of-of-band domain	μW	100	25.6055	25.6946	24.9899		
		Antenna power ^(Note.1)		mW	2.50	2.61	2.65	2.64		
		deviation		%	-70 50	4.4	6.0	5.6		
		Environmental test	-20 ℃	OBW lower frequency	GHz	76.0	76.0433	76.0436	76.0440	
				OBW Upper frequency	GHz	77.0	76.8864	76.8867	76.8873	
			60 ℃	OBW lower frequency	GHz	76.0	76.0322	76.0320	76.0329	
				OBW Upper frequency	GHz	77.0	76.8816	76.8819	76.8823	
			35 ℃ / 95 % R.H.	OBW lower frequency	GHz	76.0	76.0397	76.0393	76.0399	
				OBW Upper frequency	GHz	77.0	76.8850	76.8855	76.8851	
			Vibration	OBW lower frequency	GHz	76.0	76.0310	76.0312	76.0313	
				OBW Upper frequency	GHz	77.0	76.8850	76.8845	76.8860	
		Antenna gain		dB	40 or less		14.08			

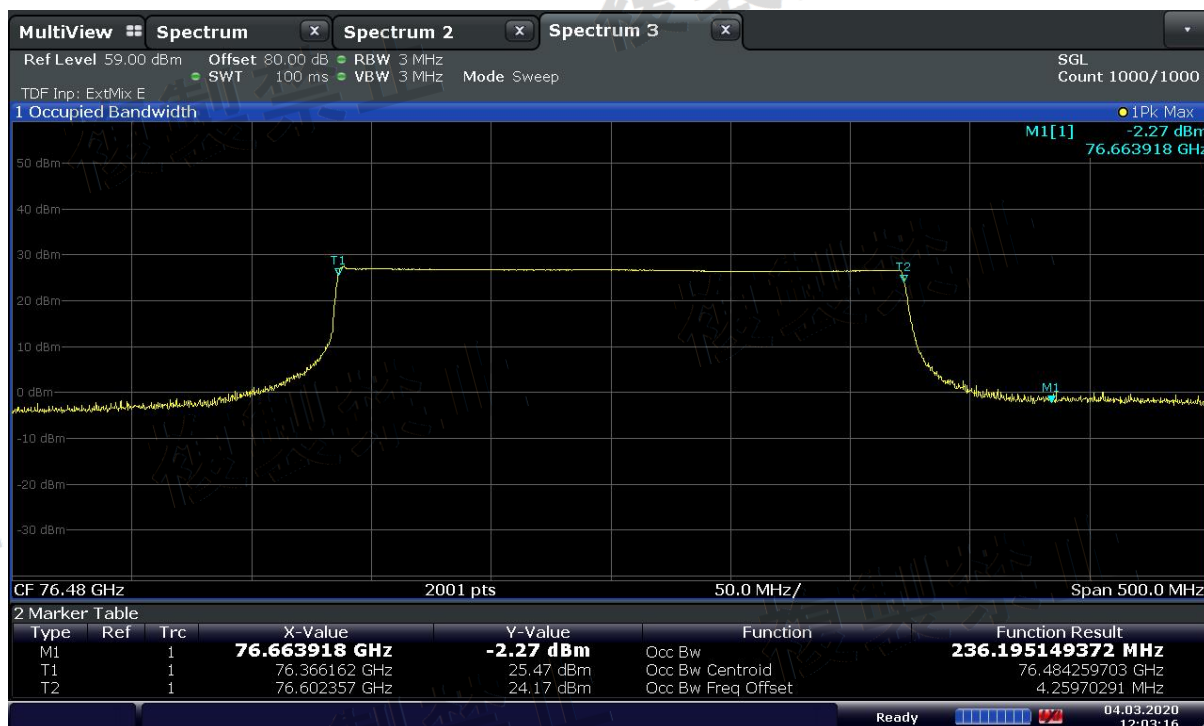
Note1. Antenna power(calculated value) = mesured EIRP value - Antenna gain

MAR120

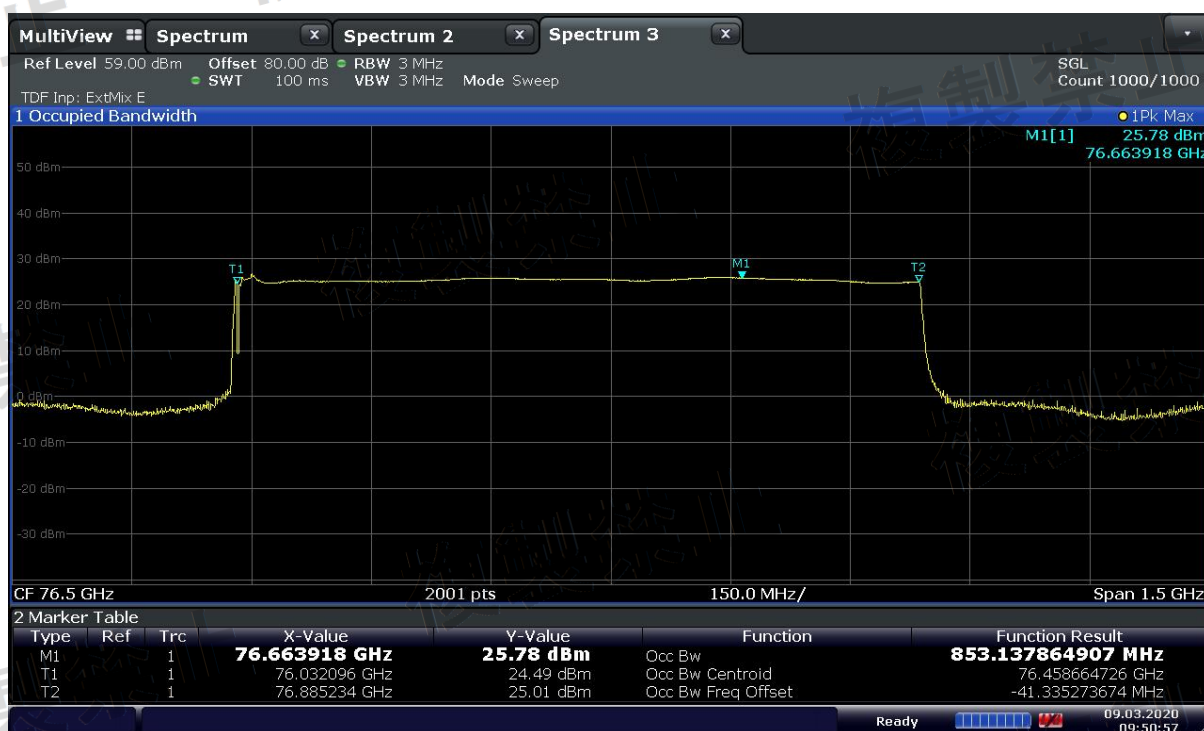
Millimeter-Wave Radar (76.5 GHz band)

Occupied Bandwidth

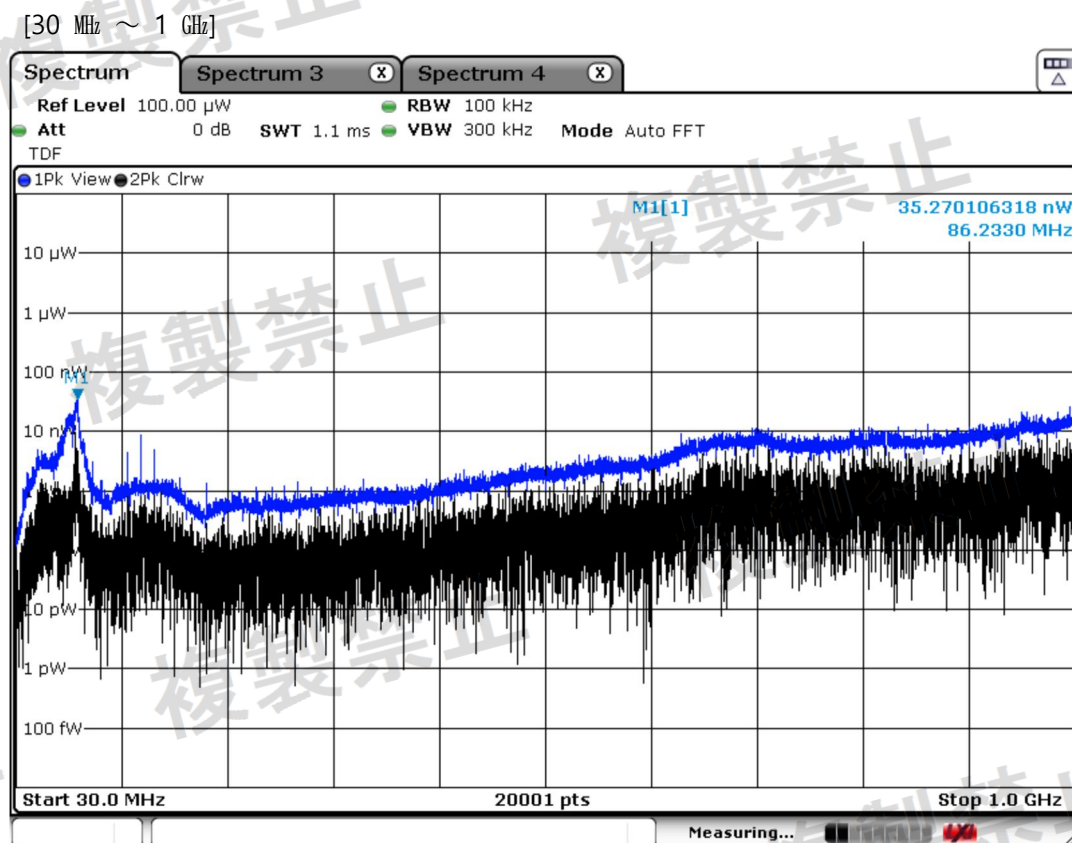
Normal Voltage_long range



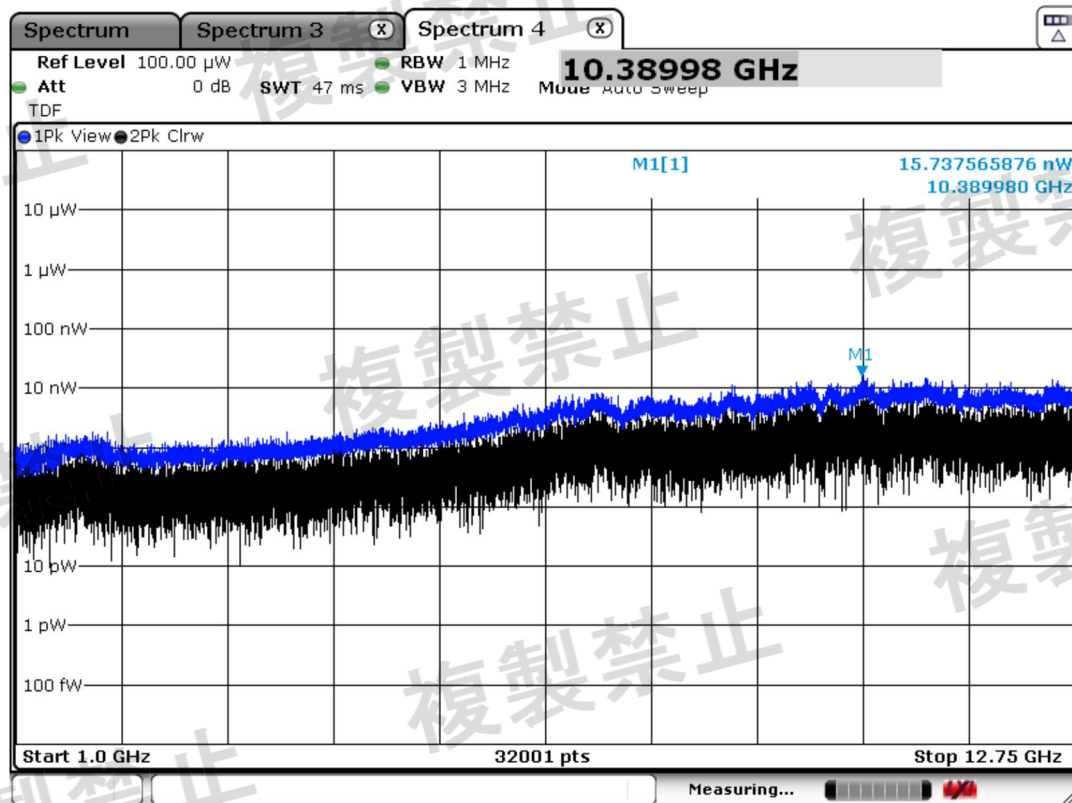
Normal Voltage_short range



MAR120

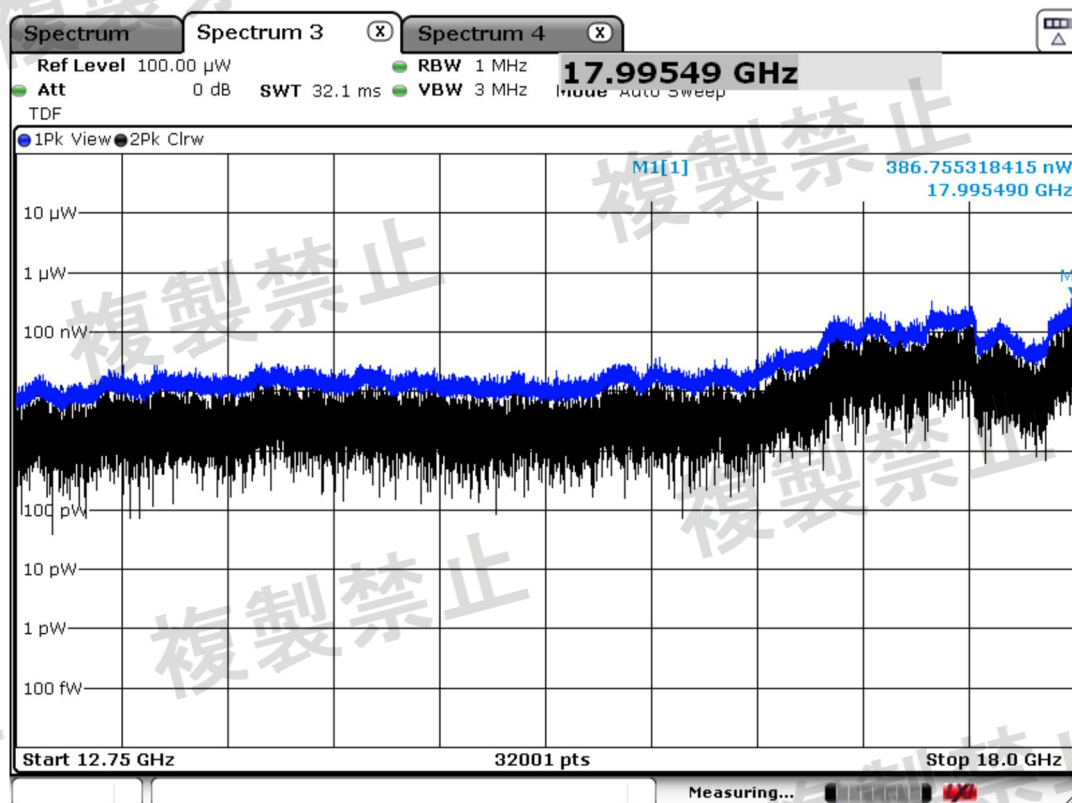


[1 GHz ~ 12.75 GHz]

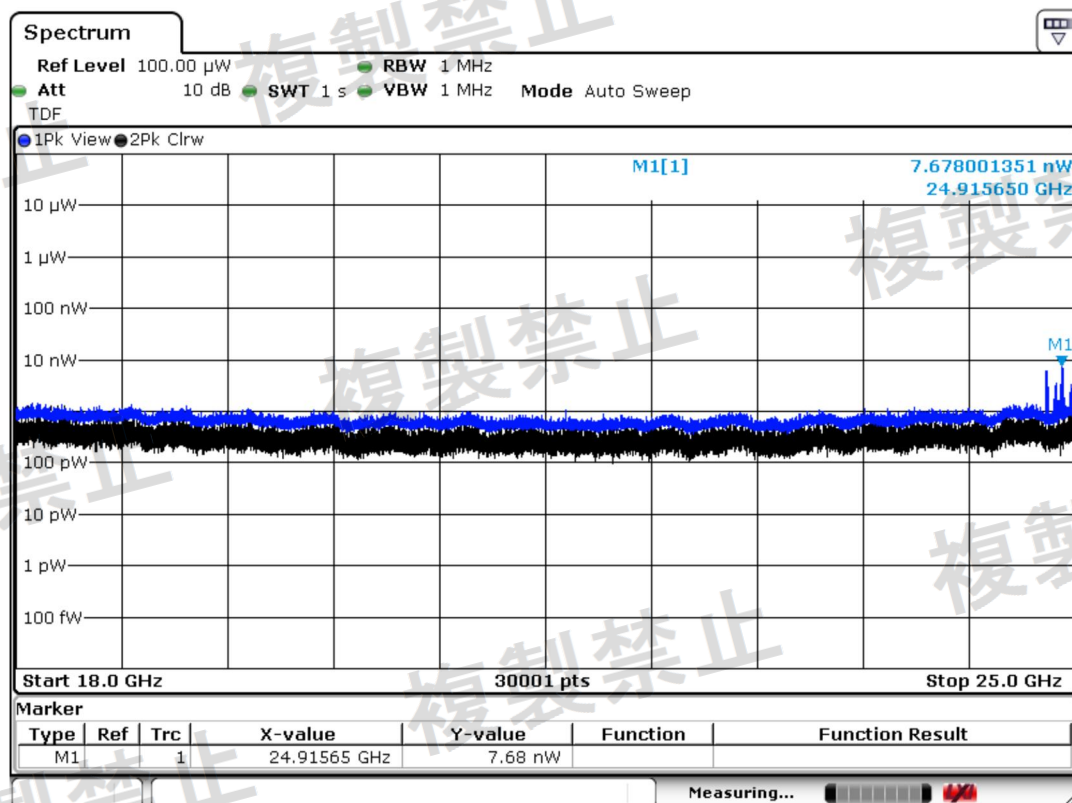


MAR120

[12.75 GHz ~ 18 GHz]

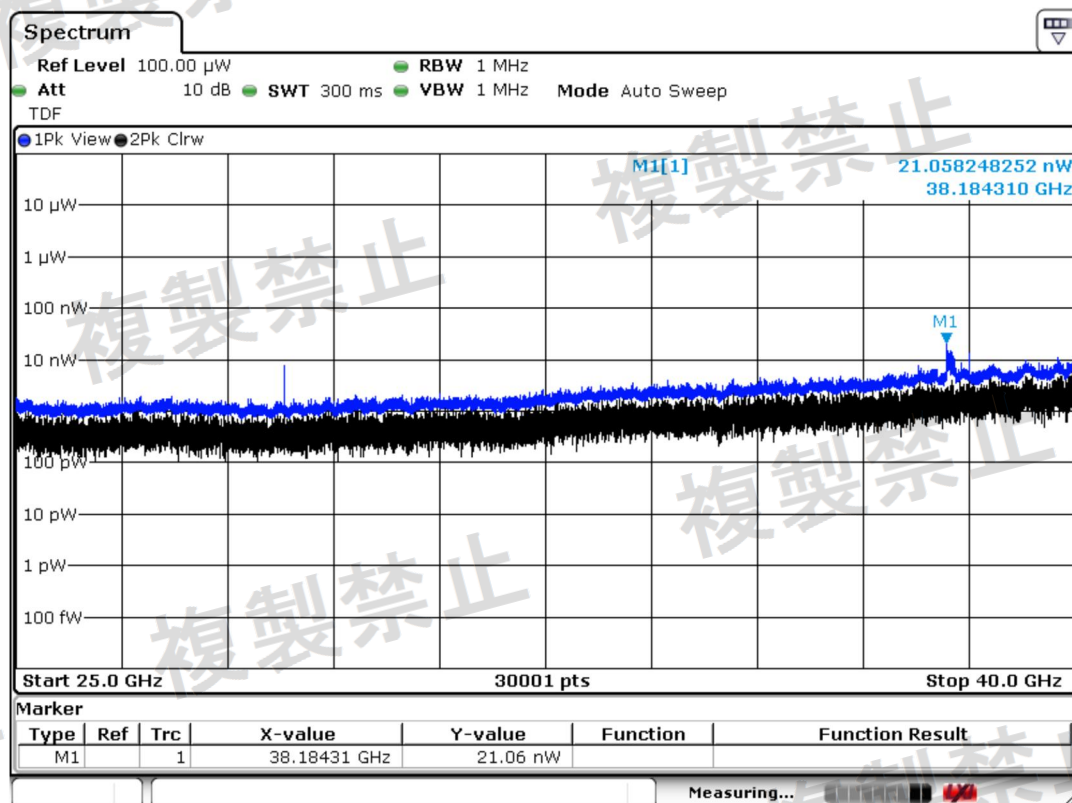


[18 GHz ~ 25 GHz]

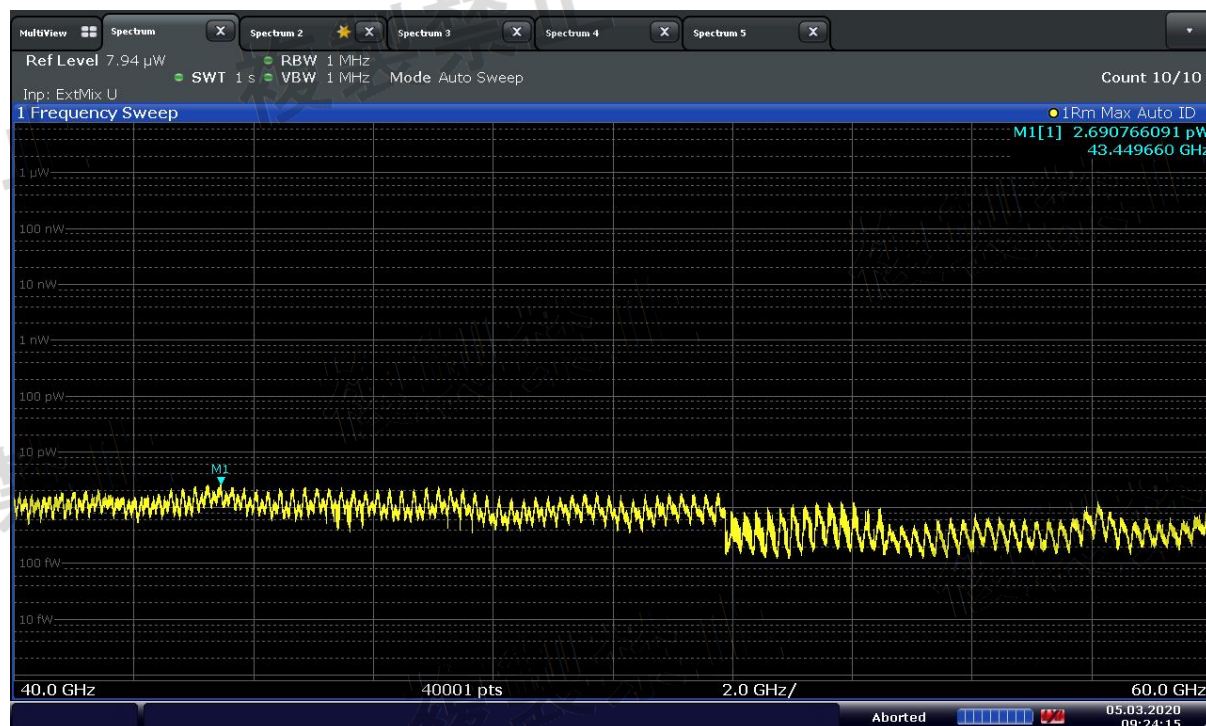


MAR120

[25 GHz ~ 40 GHz]

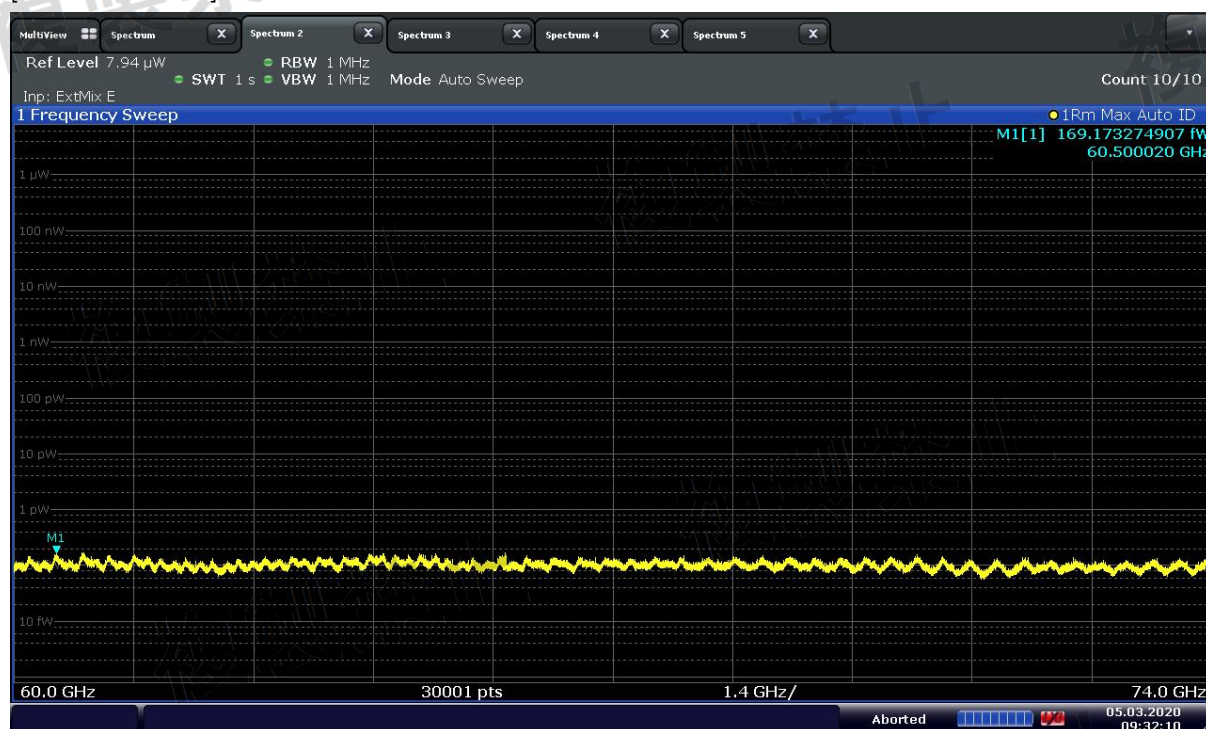


[40 GHz ~ 60 GHz]

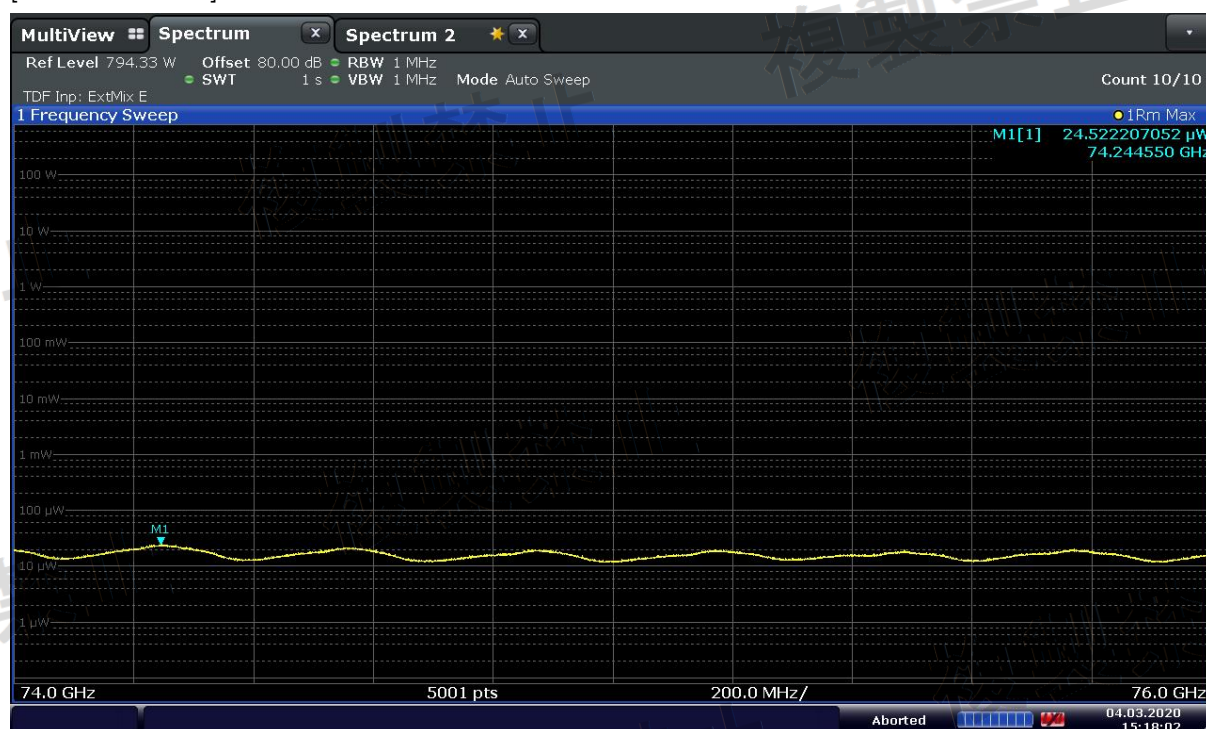


MAR120

[60 GHz ~ 74 GHz]

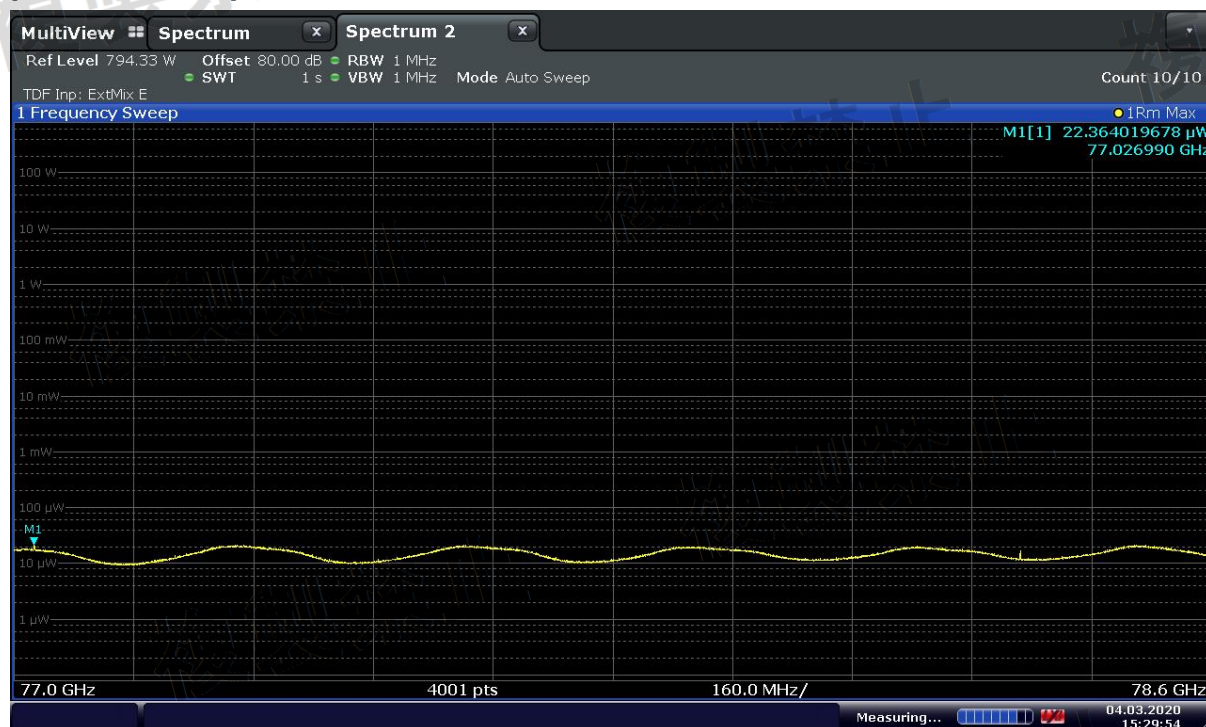


[74 GHz ~ 76 GHz]

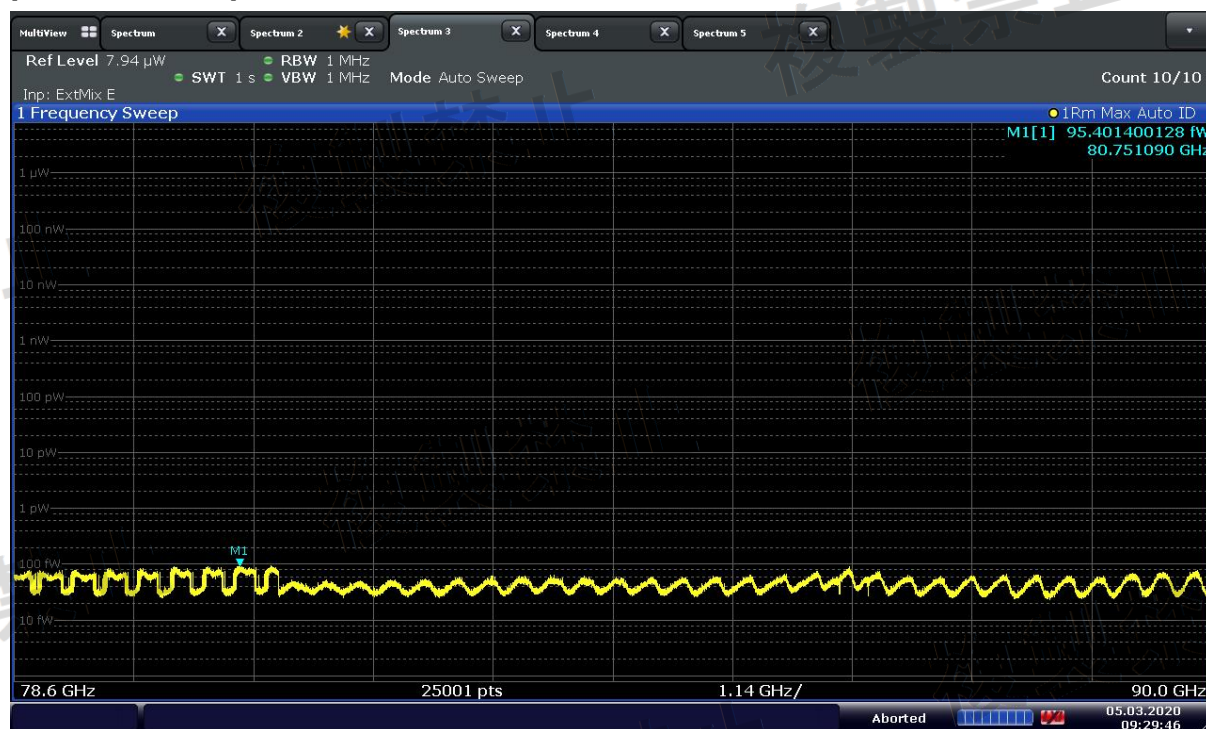


MAR120

[77 GHz ~ 78.6 GHz]

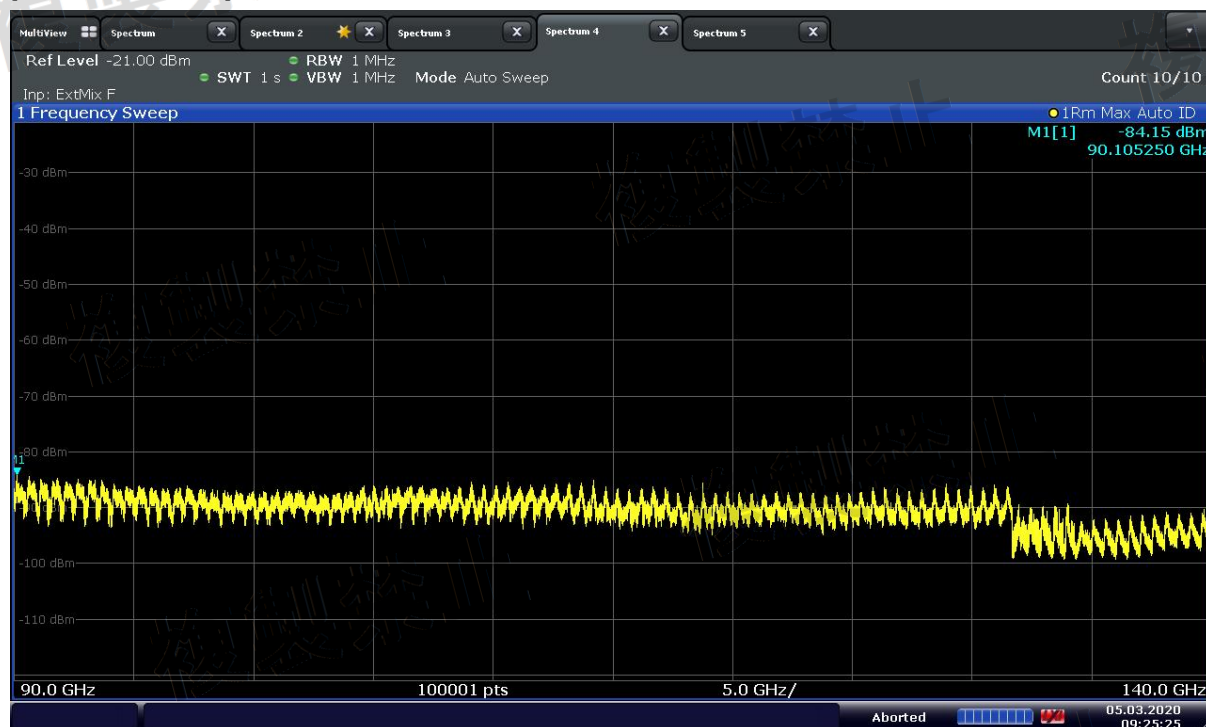


[78.6 GHz ~ 90 GHz]

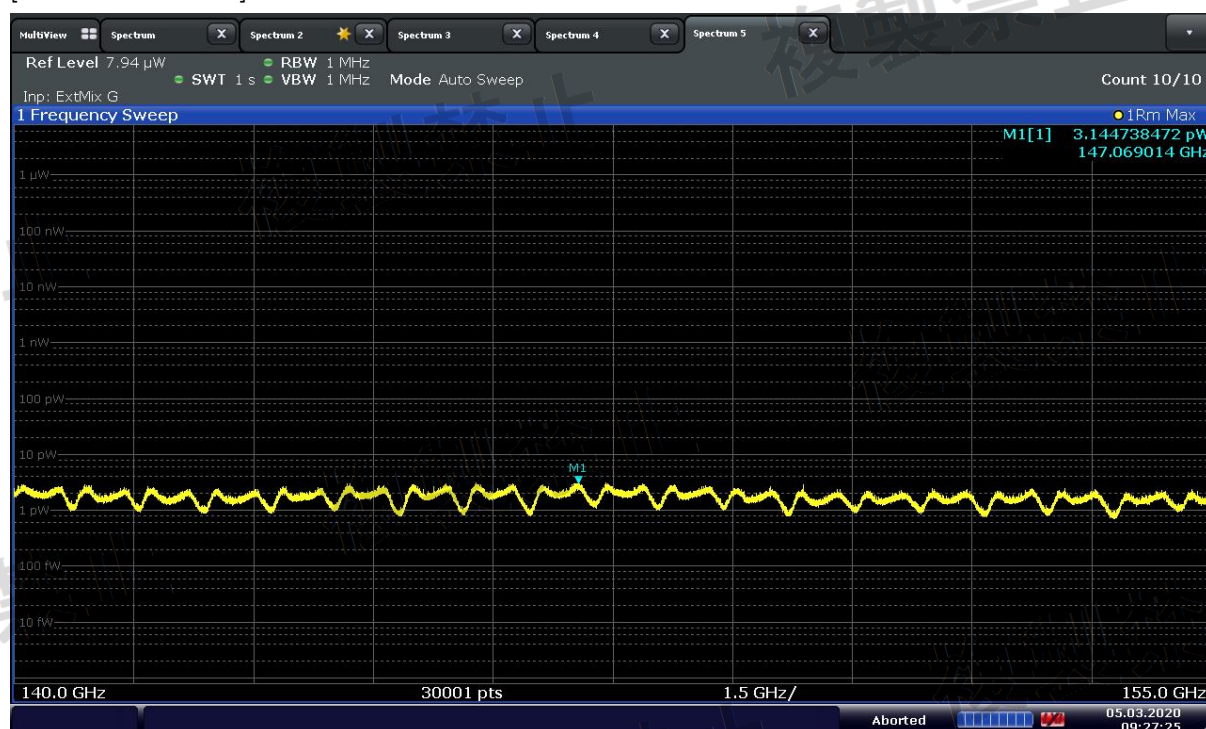


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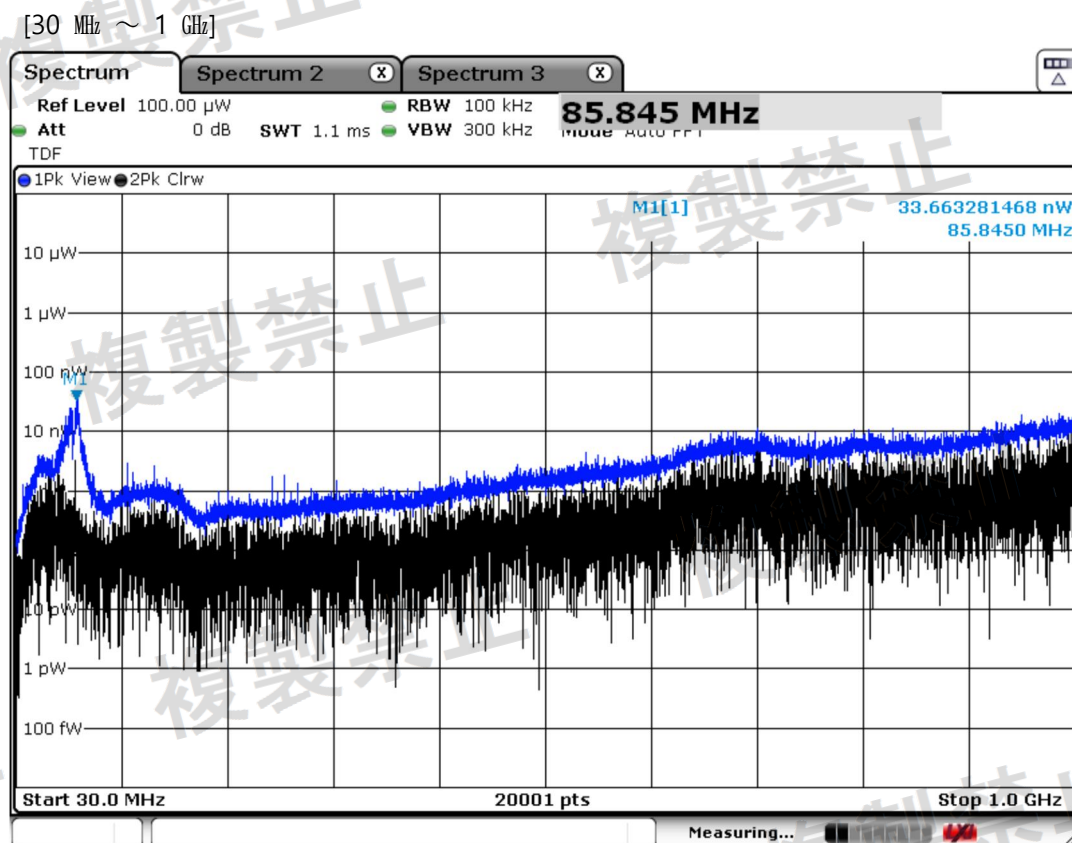
[90 GHz ~ 140 GHz]



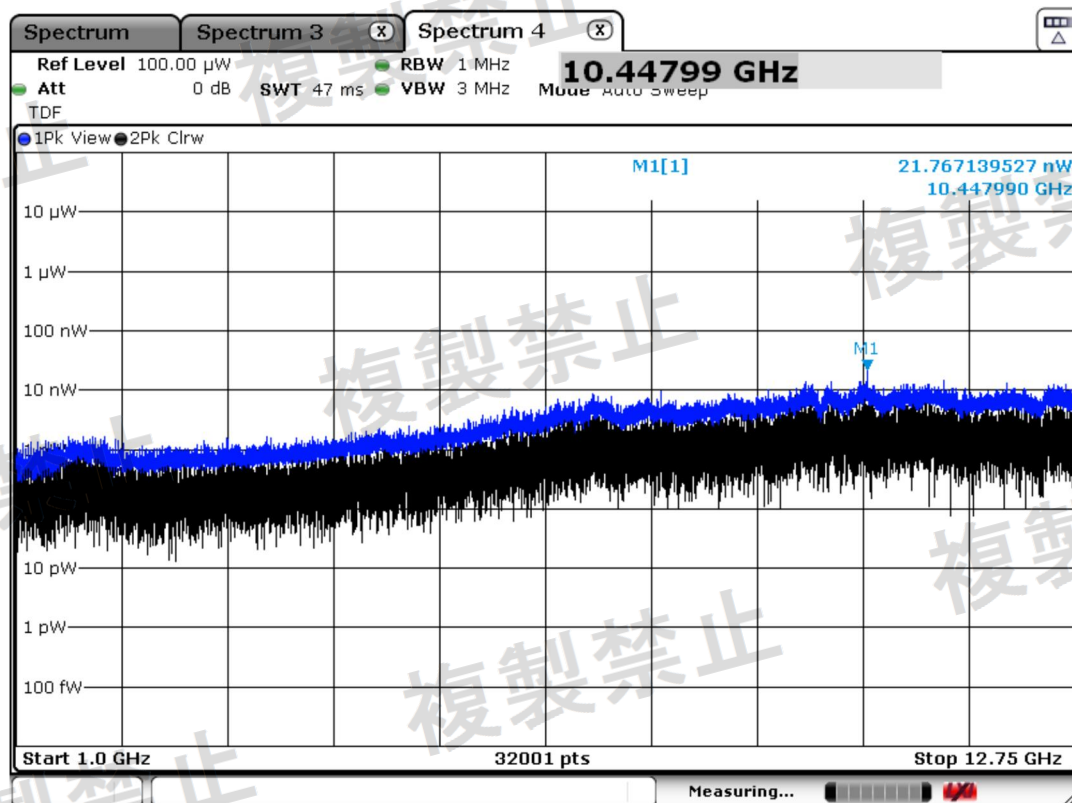
[140 GHz ~ 155 GHz]



MAR120

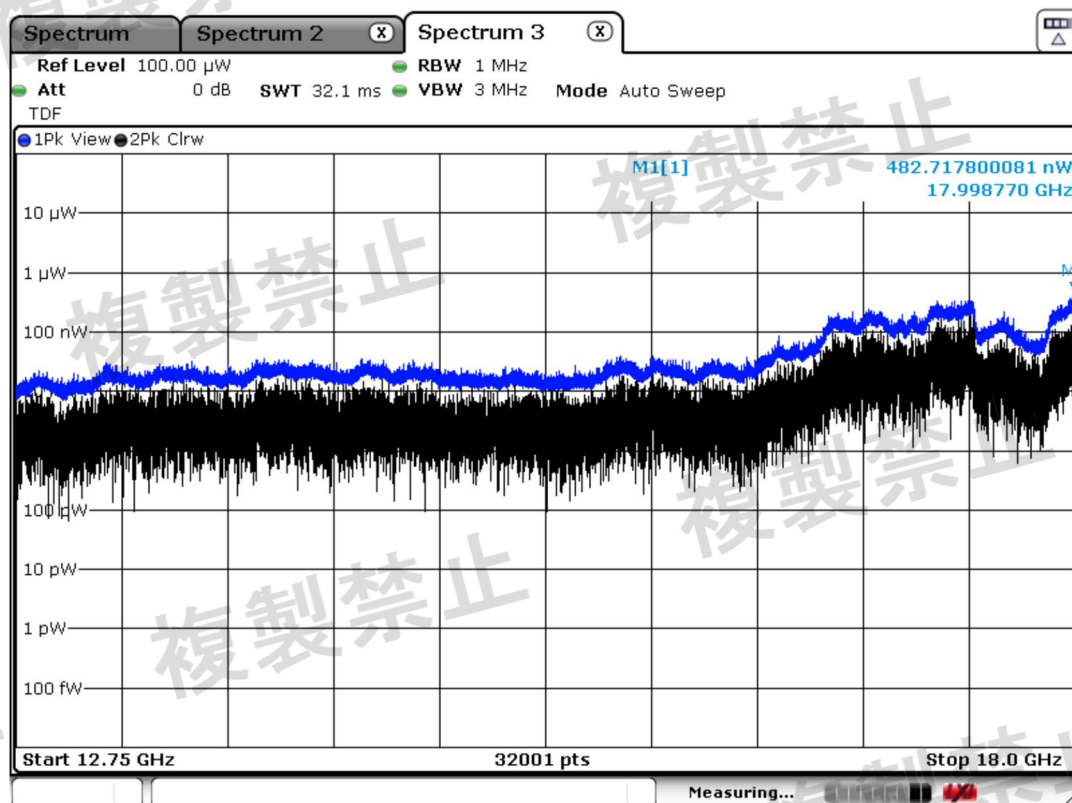


[1 GHz ~ 12.75 GHz]

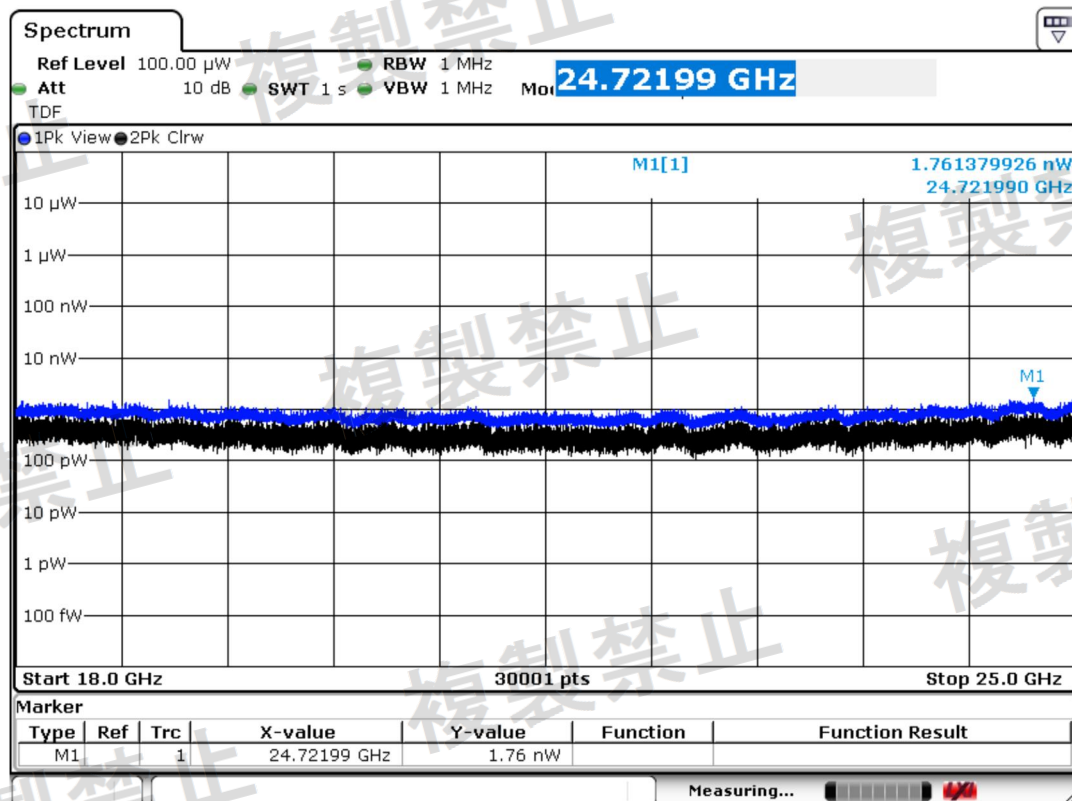


MAR120

[12.75 GHz ~ 18 GHz]

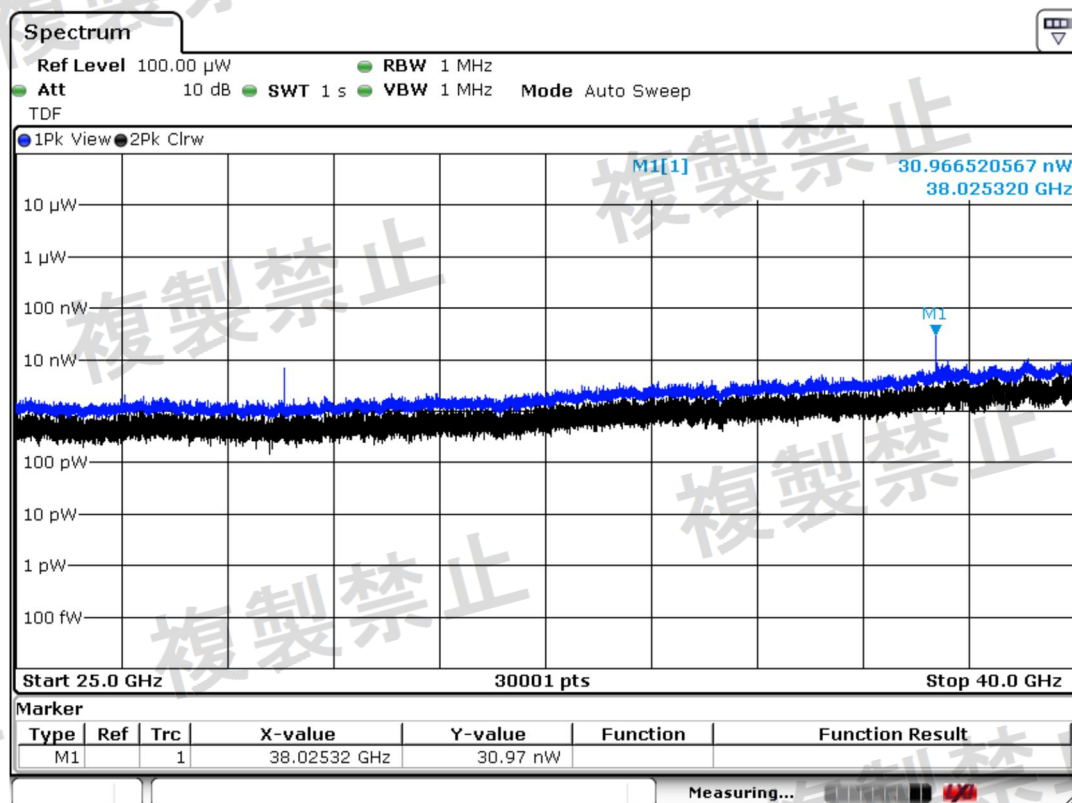


[18 GHz ~ 25 GHz]

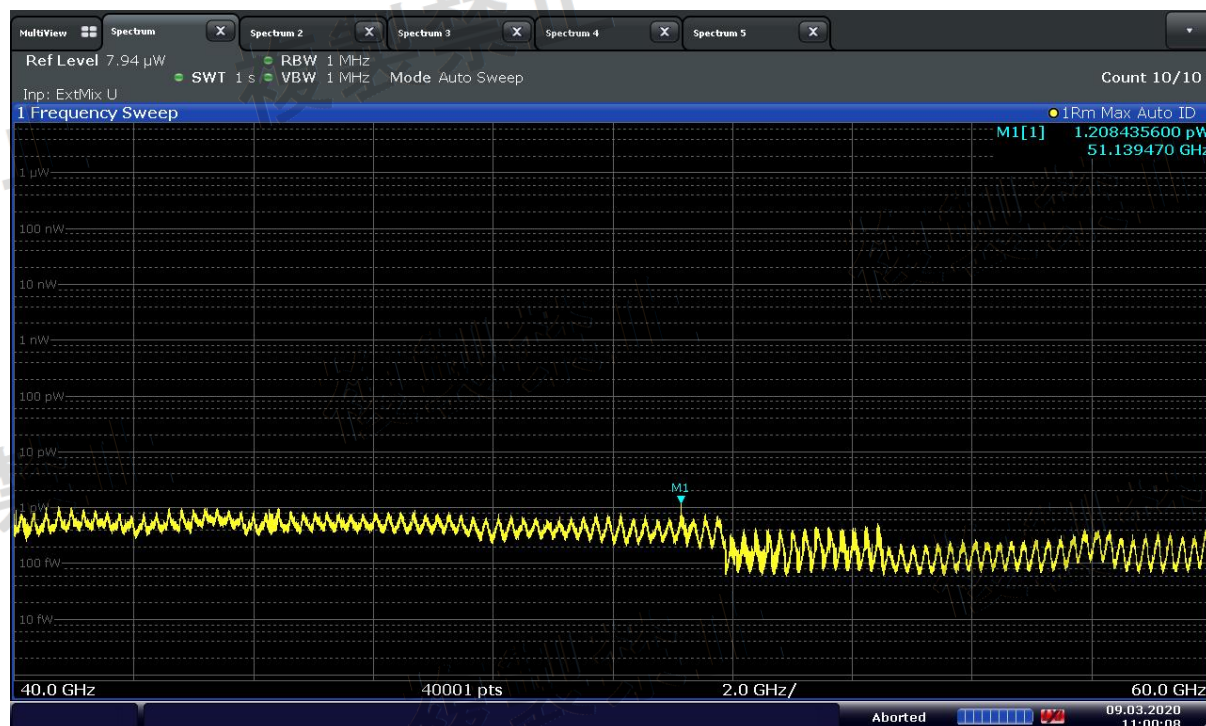


MAR120

[25 GHz ~ 40 GHz]

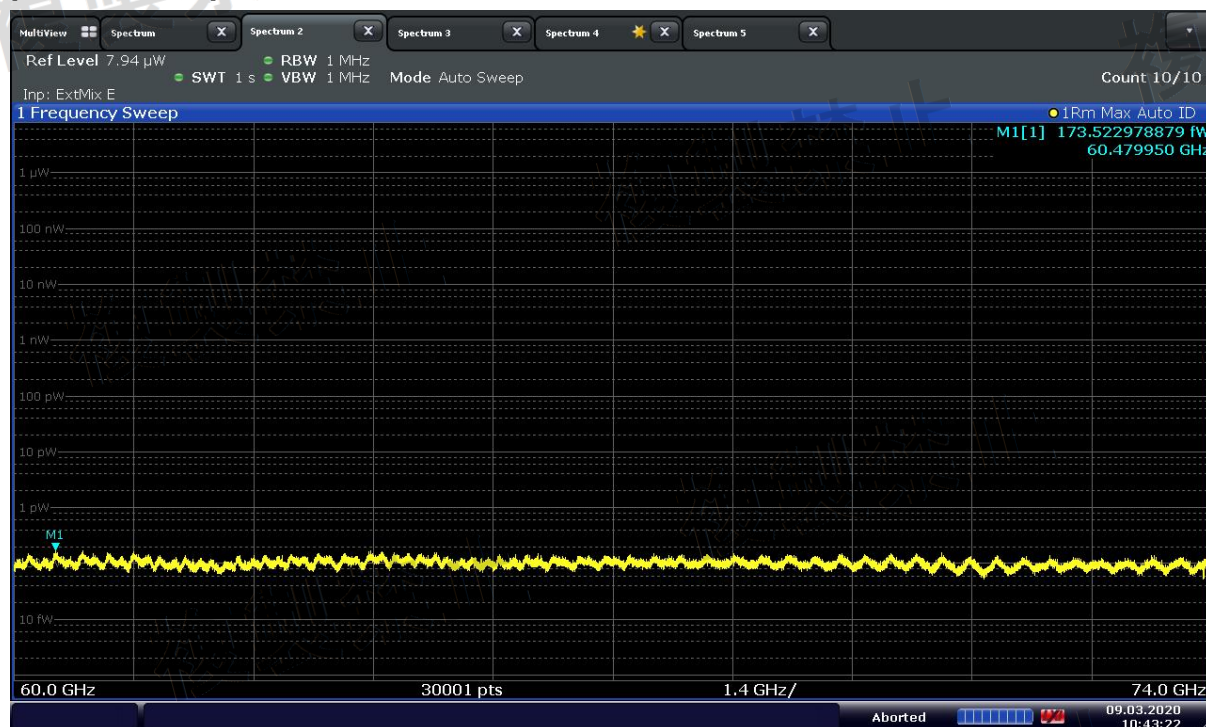


[40 GHz ~ 60 GHz]

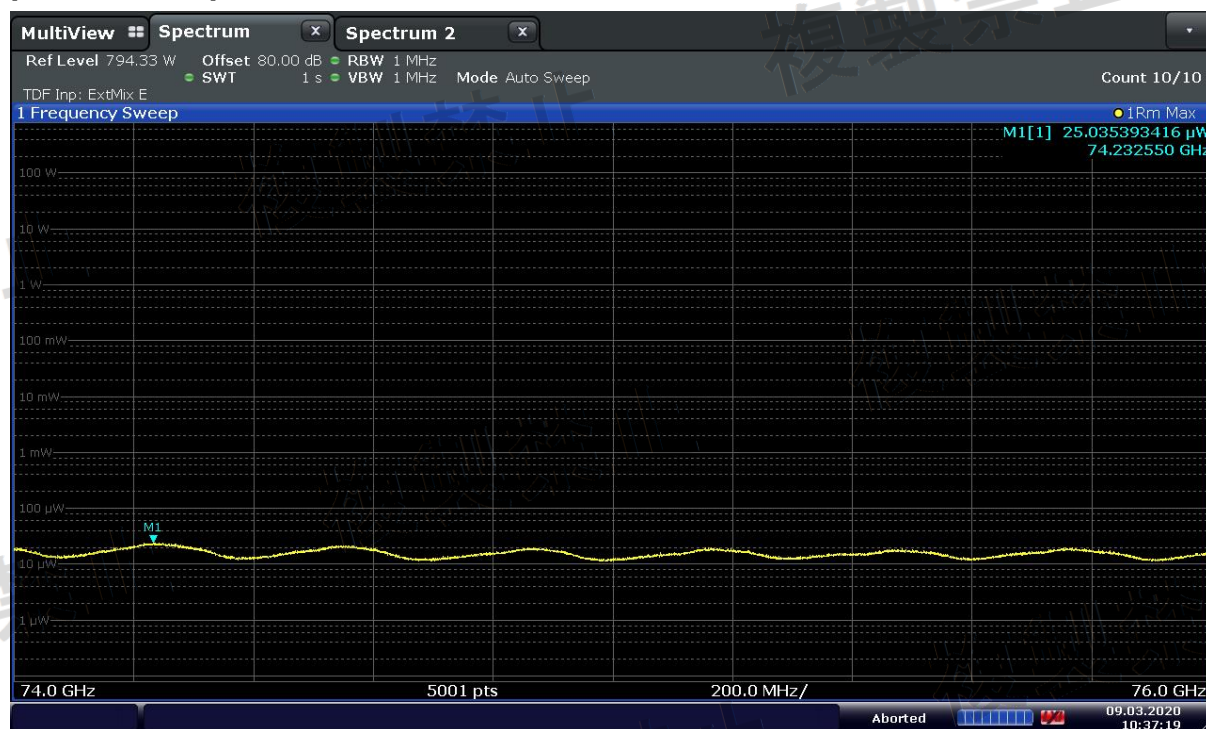


MAR120

[60 GHz ~ 74 GHz]

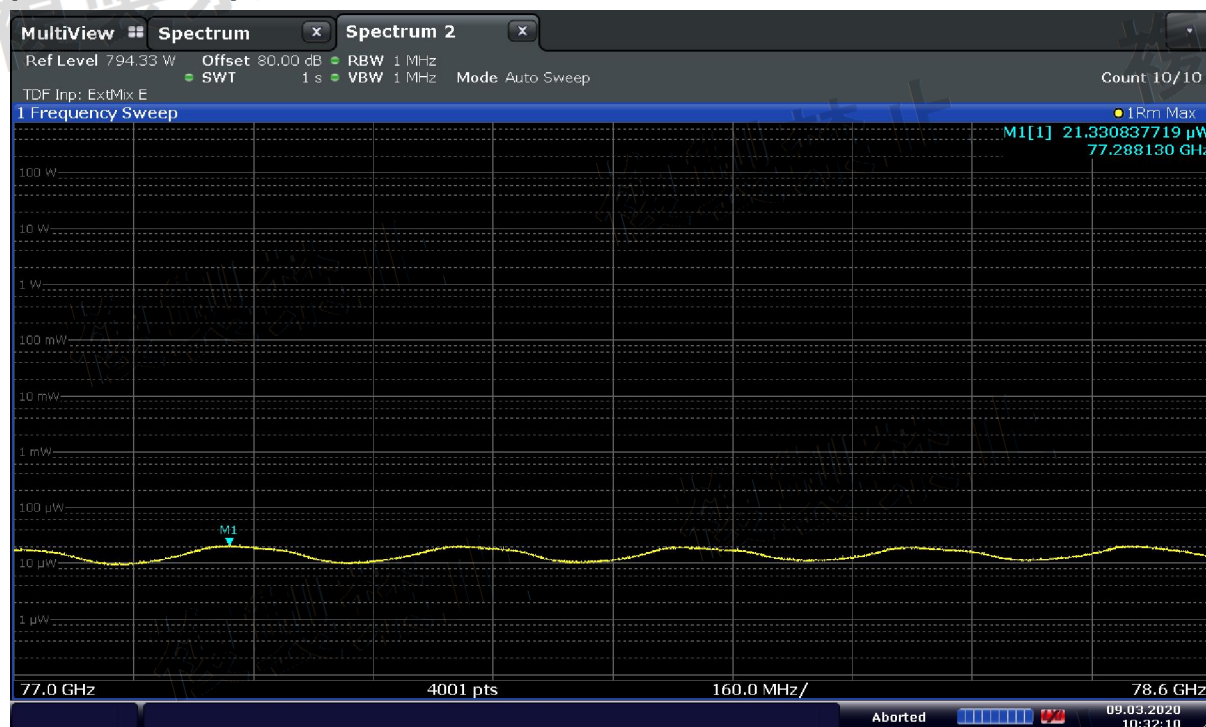


[74 GHz ~ 76 GHz]

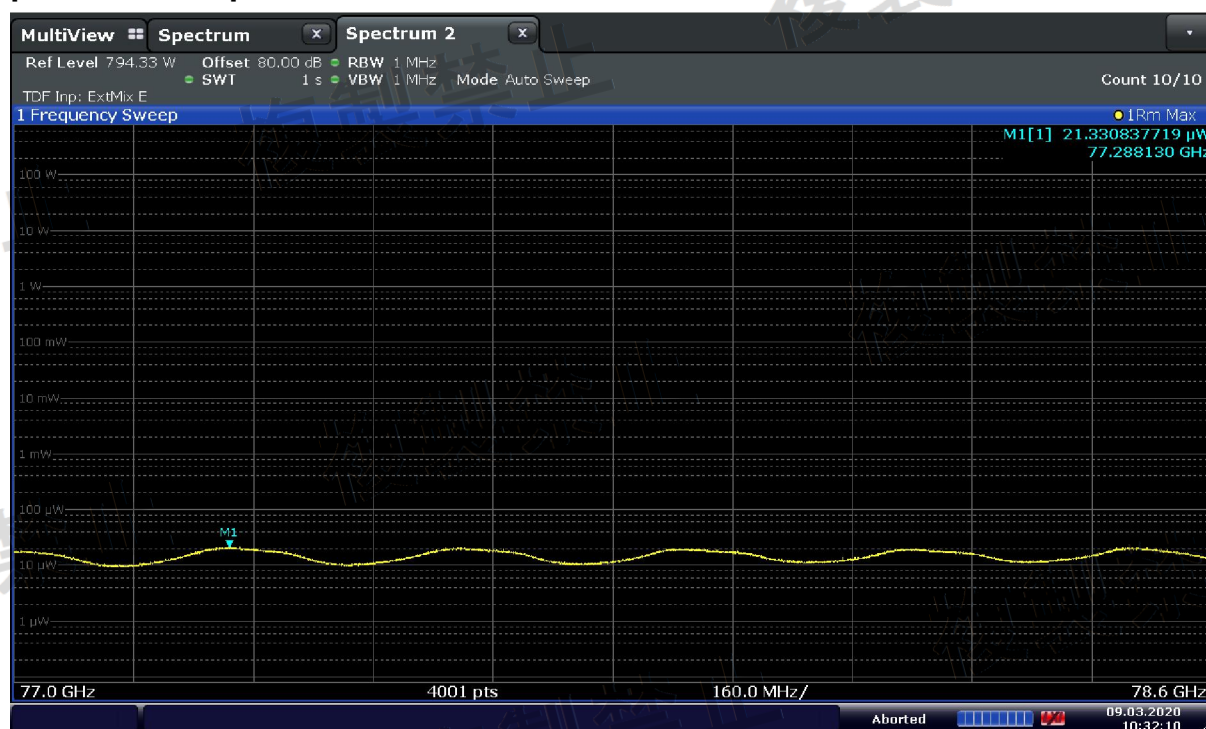


MAR120

[77 GHz ~ 78.6 GHz]

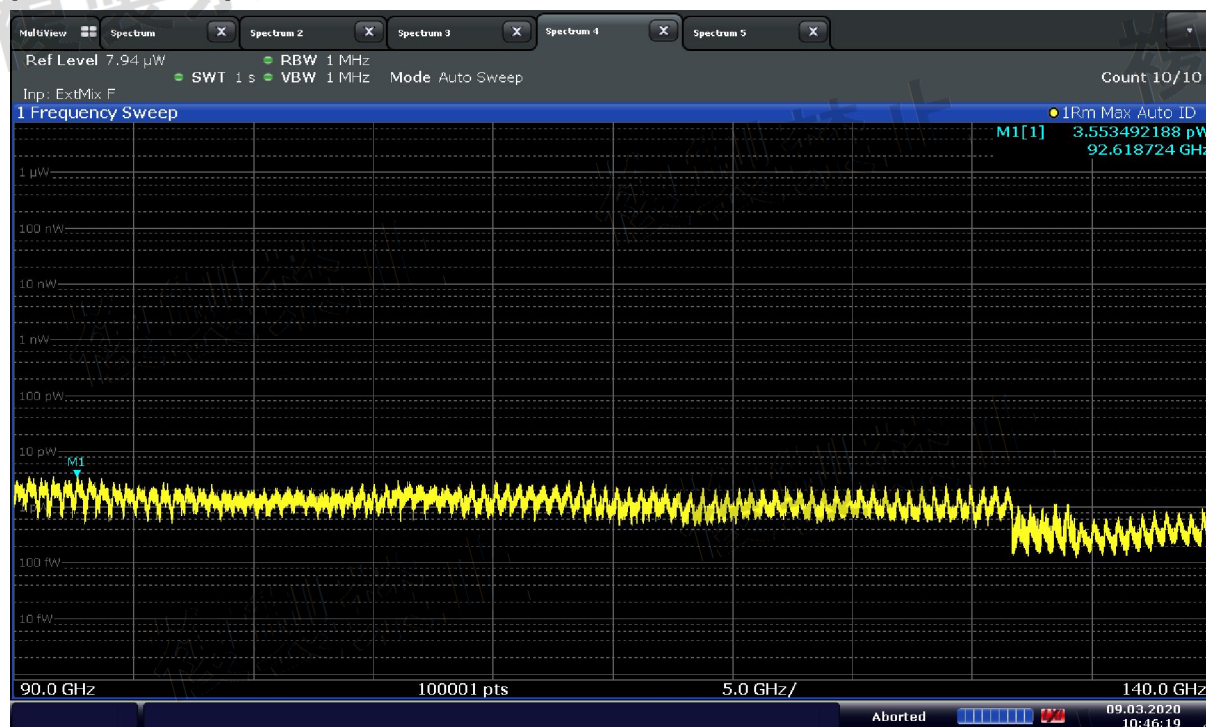


[78.6 GHz ~ 90 GHz]



MAR120

[90 GHz ~ 140 GHz]



[140 GHz ~ 155 GHz]

