Frequency Stability

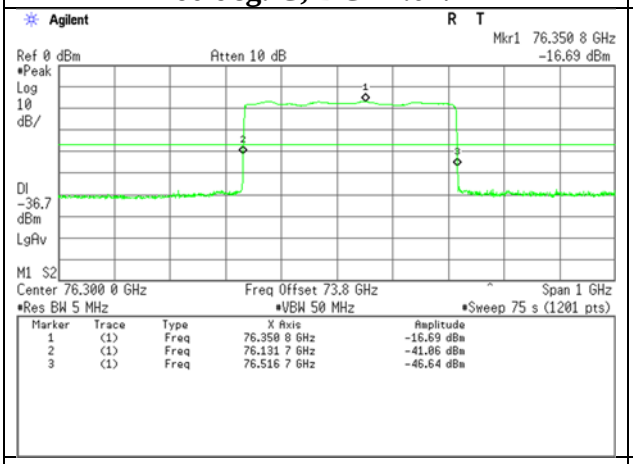
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 6, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FCM 1 Low

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.132	76.517	Customer requested temperature
50	12.0	76.133	76.517	
40	12.0	76.132	76.517	
30	12.0	76.133	76.517	
20	12.0	76.133	76.517	
20	10.2	76.133	76.518	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.133	76.517	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.134	76.517	
0	12.0	76.134	76.517	
-10	12.0	76.134	76.517	
-20	12.0	76.134	76.517	
-30	12.0	76.134	76.516	

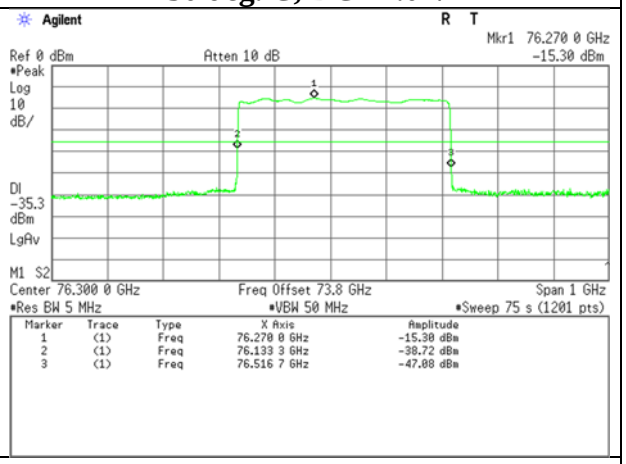
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

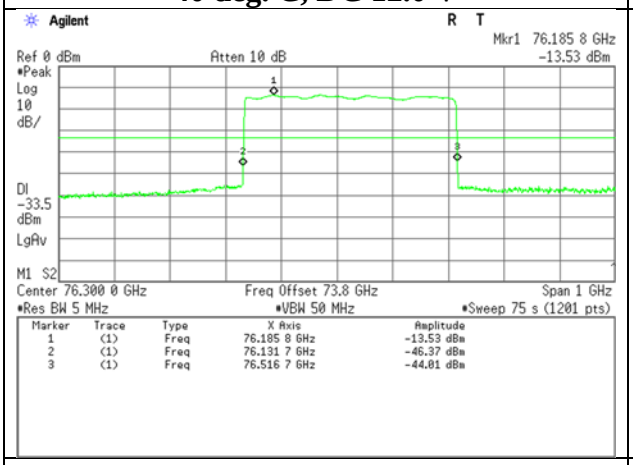
60 deg. C, DC 12.0 V



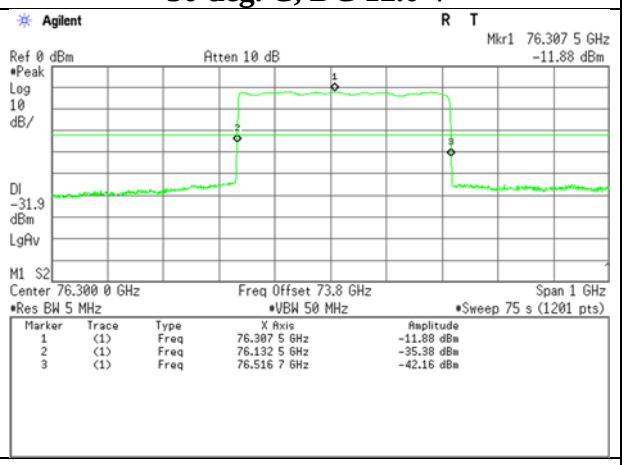
50 deg. C, DC 12.0 V



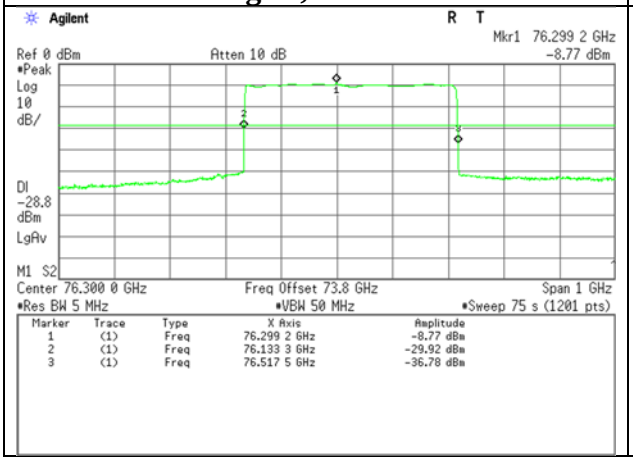
40 deg. C, DC 12.0 V



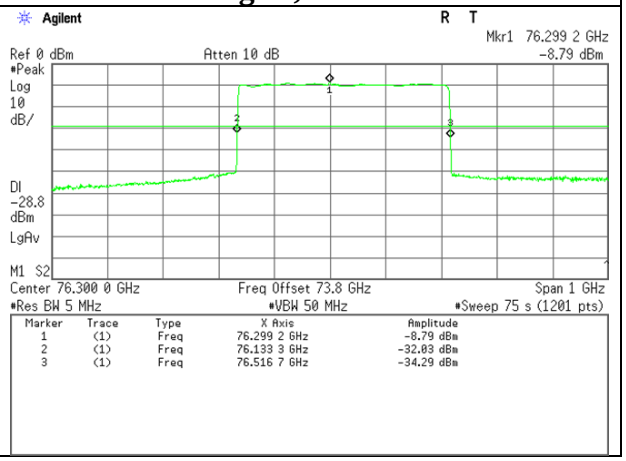
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

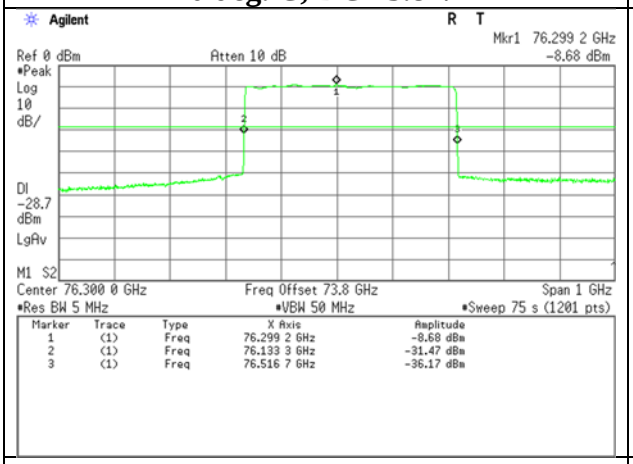


20 deg. C, DC 10.2 V

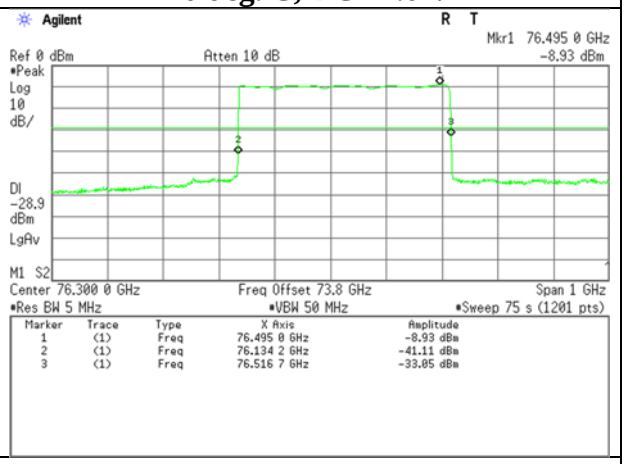


Frequency Stability

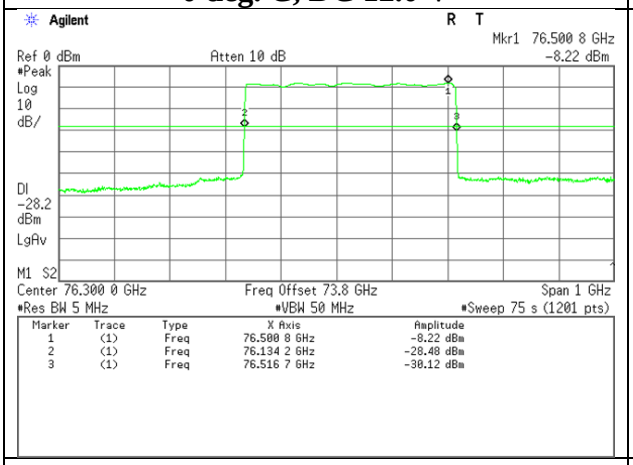
20 deg. C, DC 13.8 V



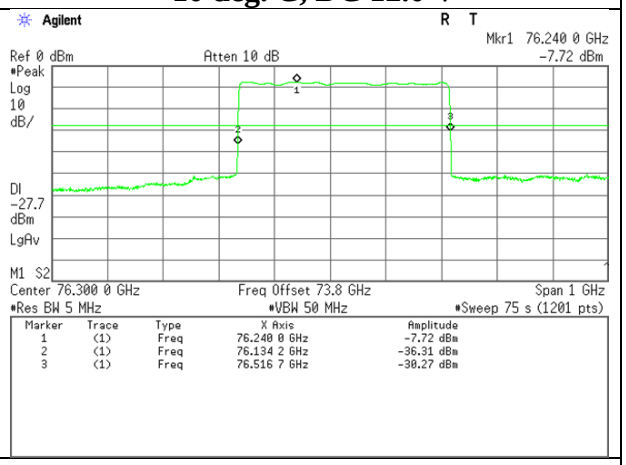
10 deg. C, DC 12.0 V



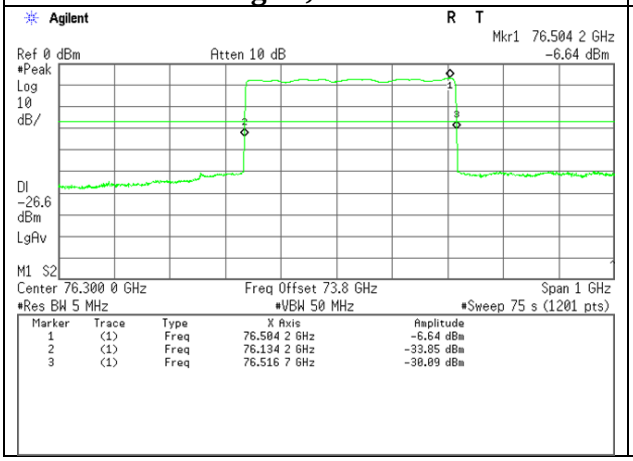
0 deg. C, DC 12.0 V



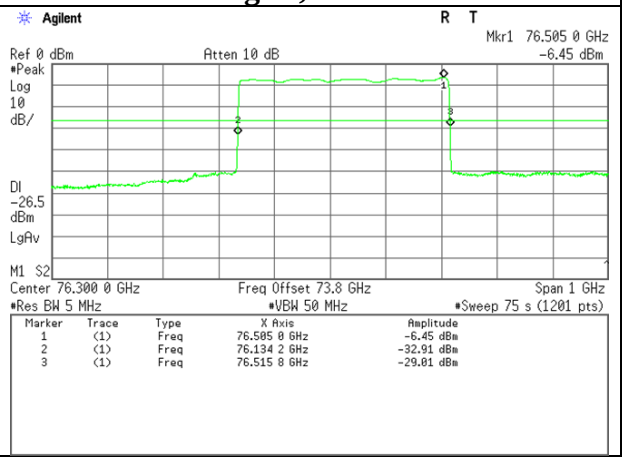
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

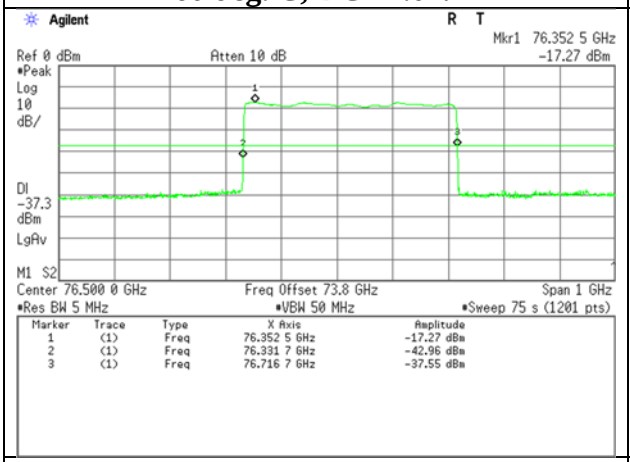
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 6, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FCM 1 Mid

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.332	76.717	Customer requested temperature
50	12.0	76.332	76.717	
40	12.0	76.333	76.717	
30	12.0	76.333	76.718	
20	12.0	76.333	76.718	
20	10.2	76.332	76.719	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.333	76.718	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.333	76.718	
0	12.0	76.334	76.718	
-10	12.0	76.334	76.718	
-20	12.0	76.334	76.718	
-30	12.0	76.335	76.717	

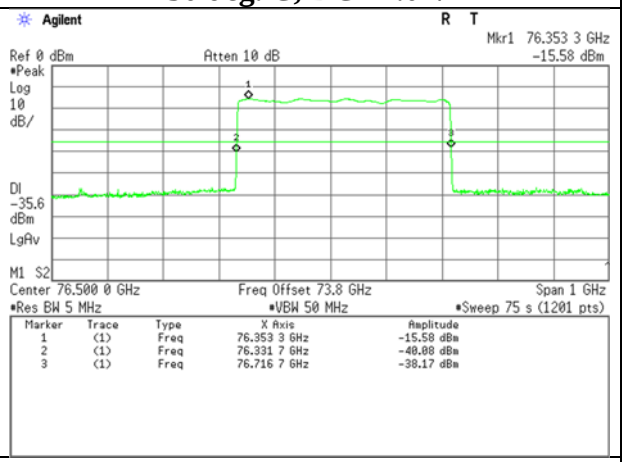
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

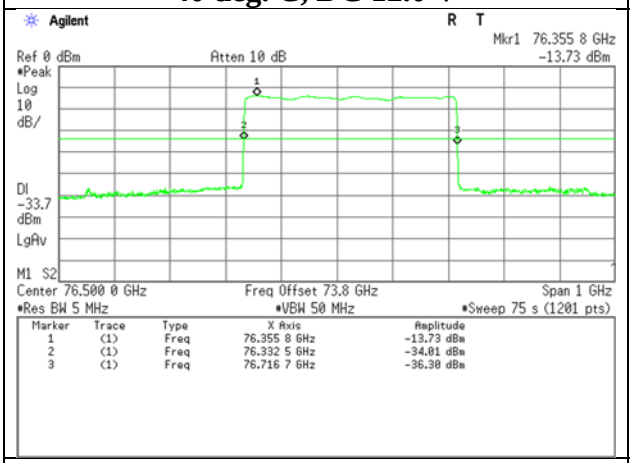
60 deg. C, DC 12.0 V



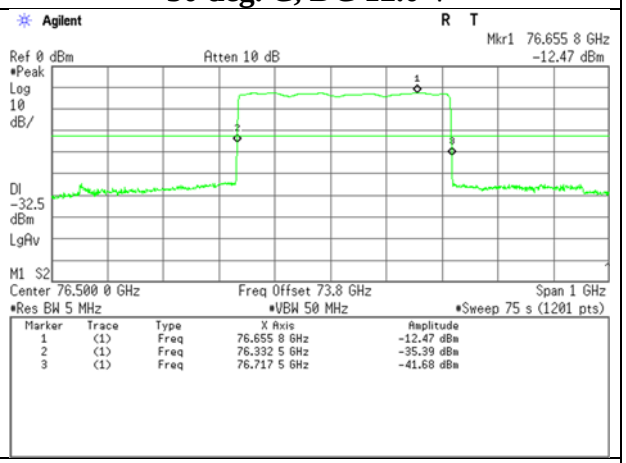
50 deg. C, DC 12.0 V



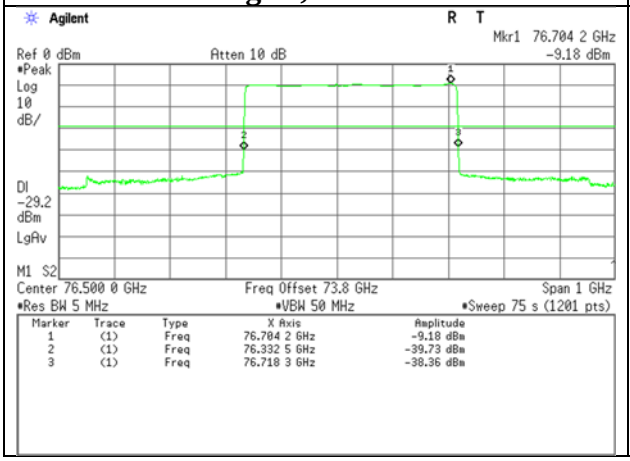
40 deg. C, DC 12.0 V



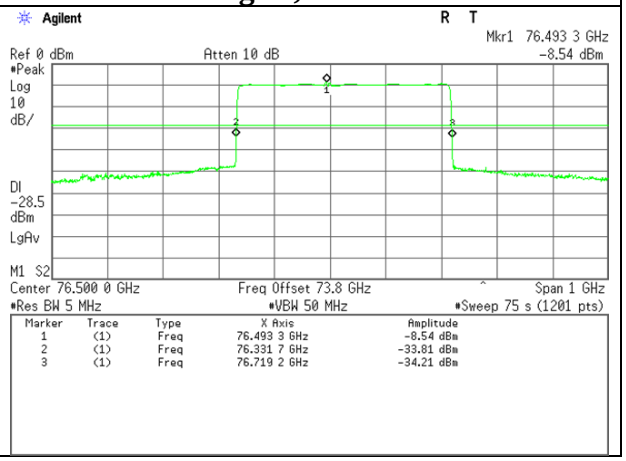
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

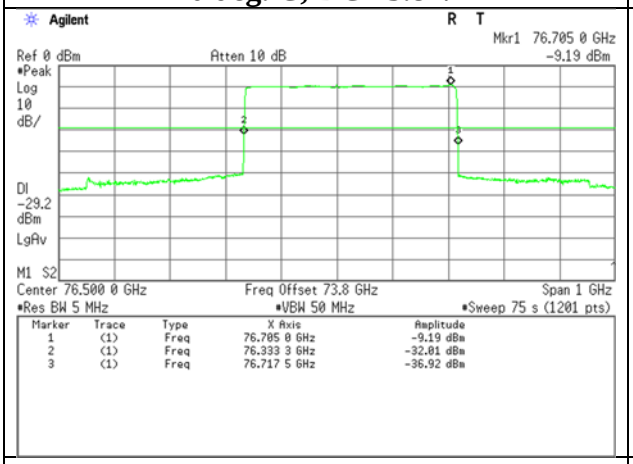


20 deg. C, DC 10.2 V

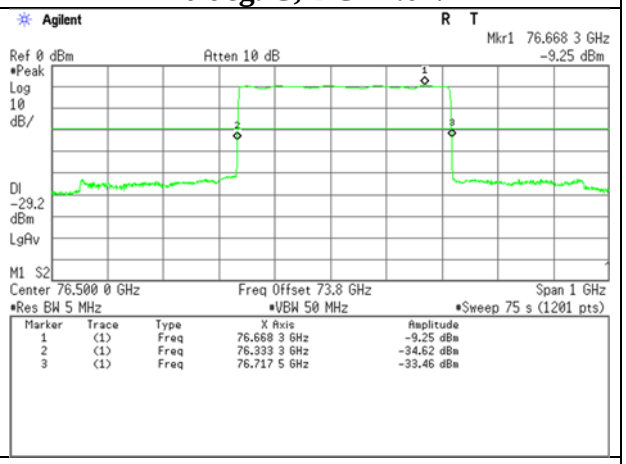


Frequency Stability

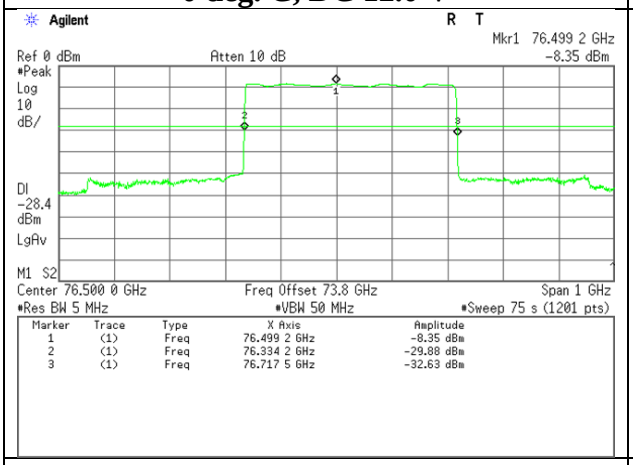
20 deg. C, DC 13.8 V



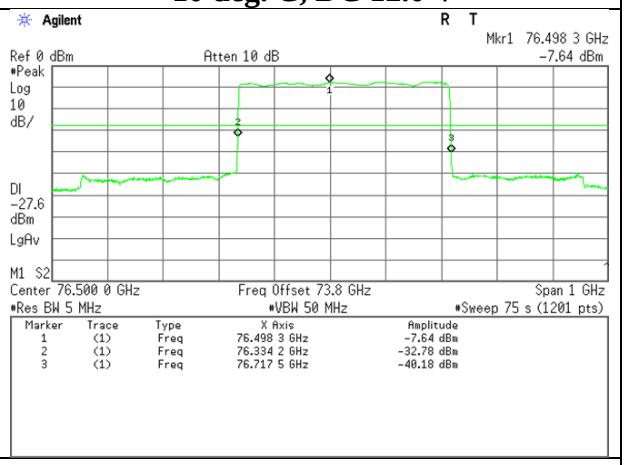
10 deg. C, DC 12.0 V



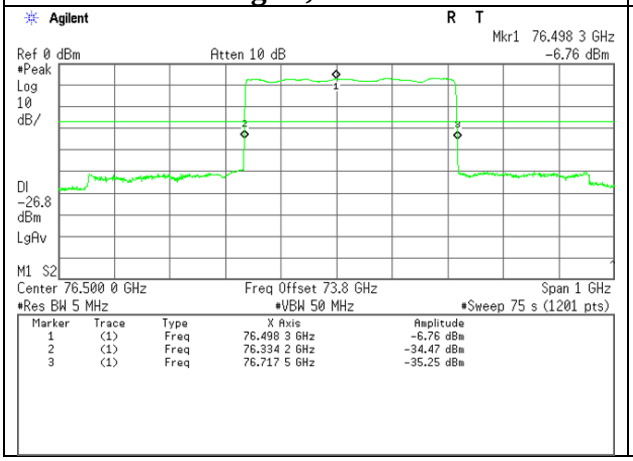
0 deg. C, DC 12.0 V



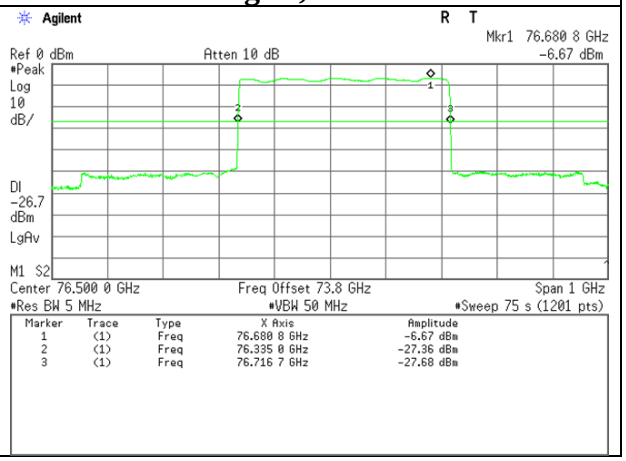
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

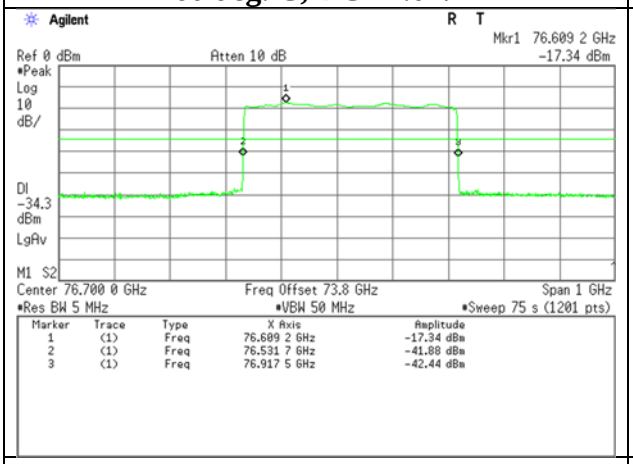
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 6, 2020
Temperature / Humidity	23 deg. C / 56 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FCM 1 High

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.532	76.918	Customer requested temperature
50	12.0	76.532	76.918	
40	12.0	76.532	76.918	
30	12.0	76.533	76.918	
20	12.0	76.533	76.918	
20	10.2	76.533	76.918	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.533	76.918	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.533	76.918	
0	12.0	76.534	76.918	
-10	12.0	76.534	76.918	
-20	12.0	76.534	76.918	
-30	12.0	76.534	76.918	

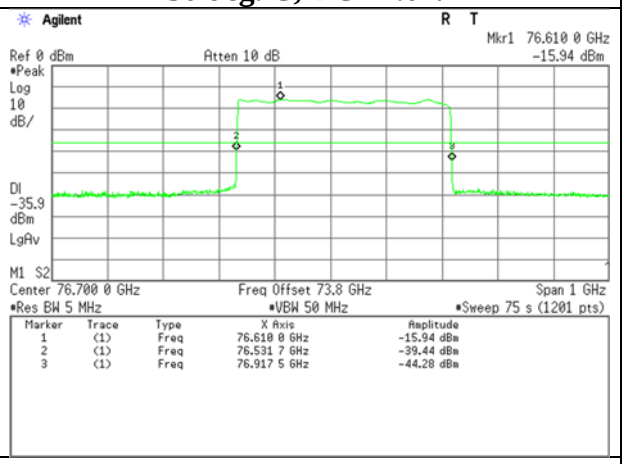
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

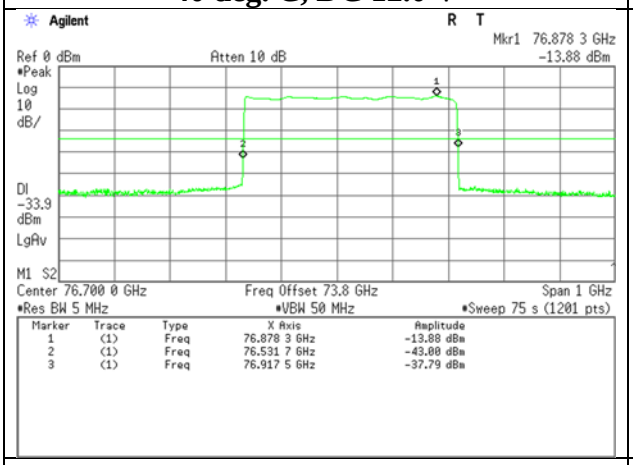
60 deg. C, DC 12.0 V



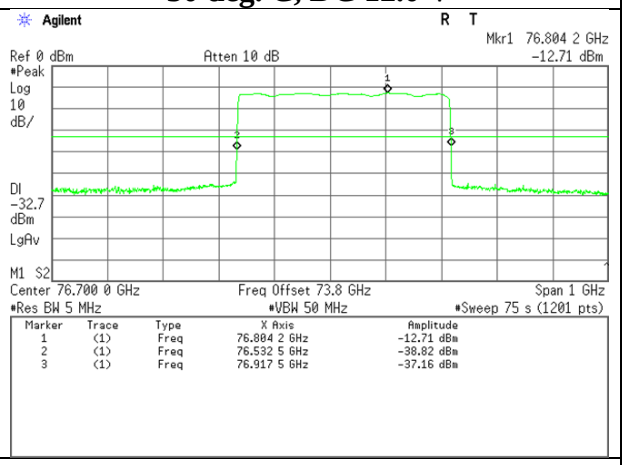
50 deg. C, DC 12.0 V



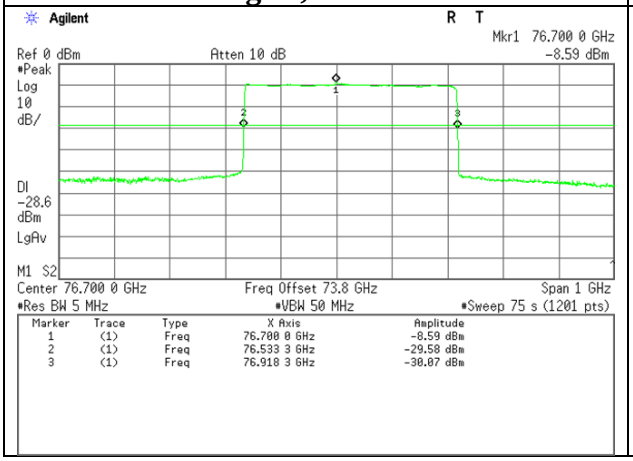
40 deg. C, DC 12.0 V



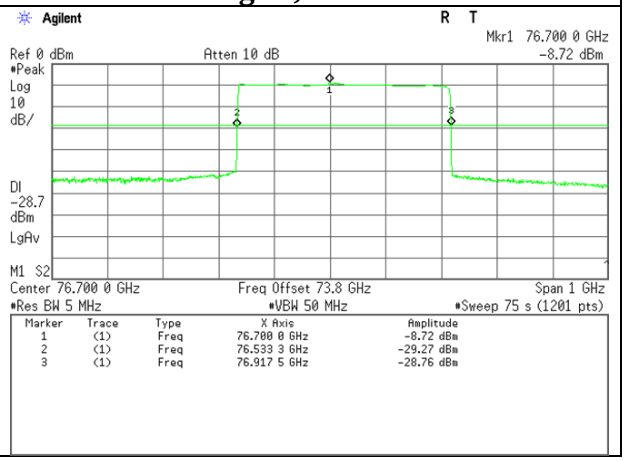
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

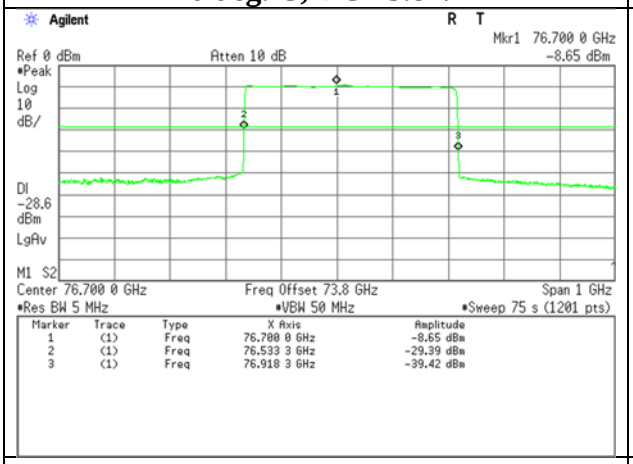


20 deg. C, DC 10.2 V

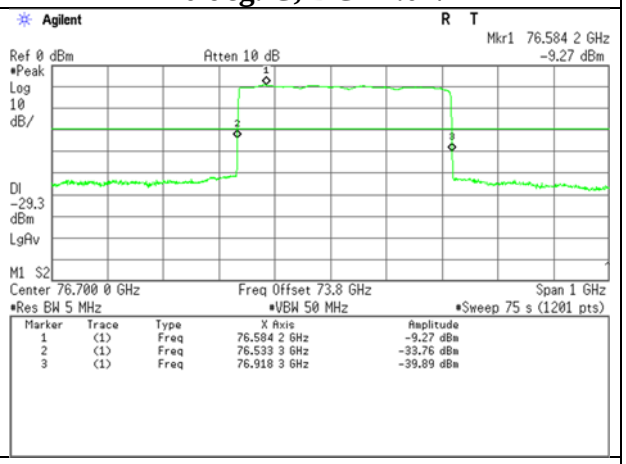


Frequency Stability

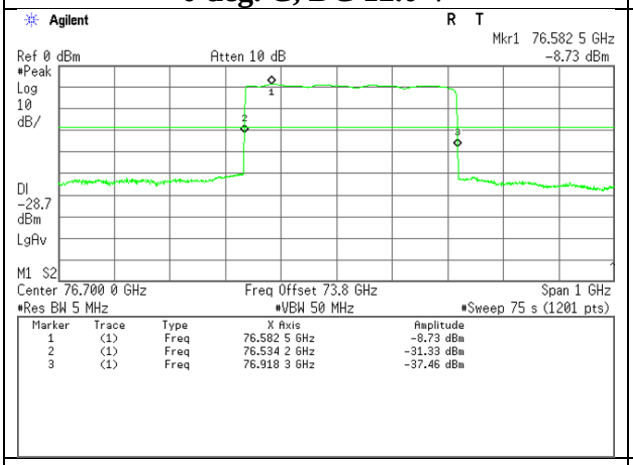
20 deg. C, DC 13.8 V



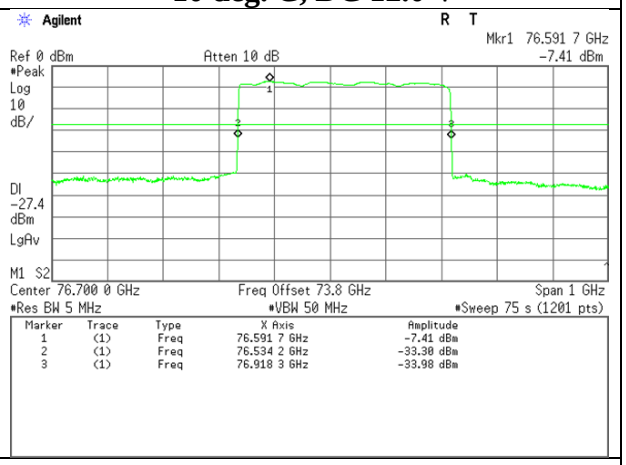
10 deg. C, DC 12.0 V



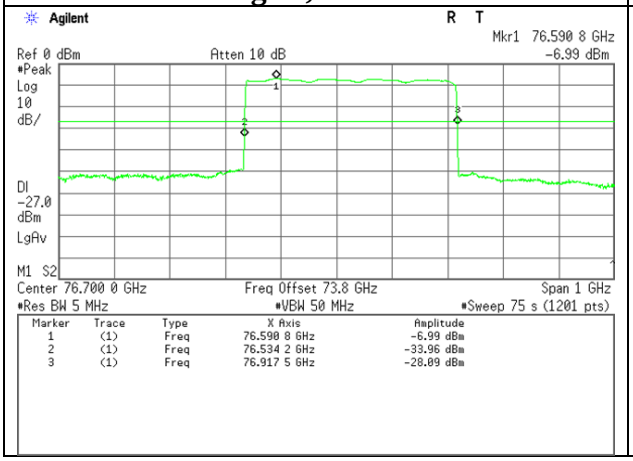
0 deg. C, DC 12.0 V



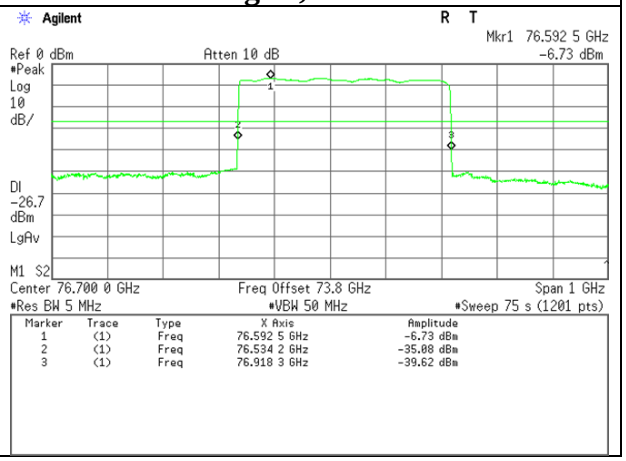
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

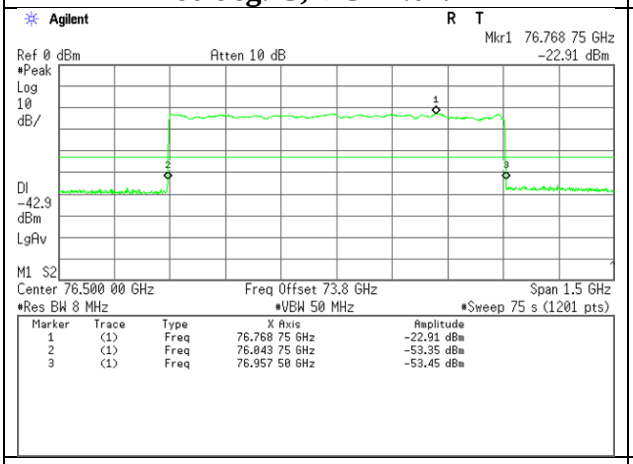
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FMC 2 ch 1

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.044	76.958	Customer requested temperature
50	12.0	76.045	76.958	
40	12.0	76.045	76.958	
30	12.0	76.046	76.958	
20	12.0	76.046	76.959	
20	10.2	76.048	76.958	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.046	76.958	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.046	76.959	
0	12.0	76.048	76.959	
-10	12.0	76.048	76.959	
-20	12.0	76.049	76.959	
-30	12.0	76.049	76.960	

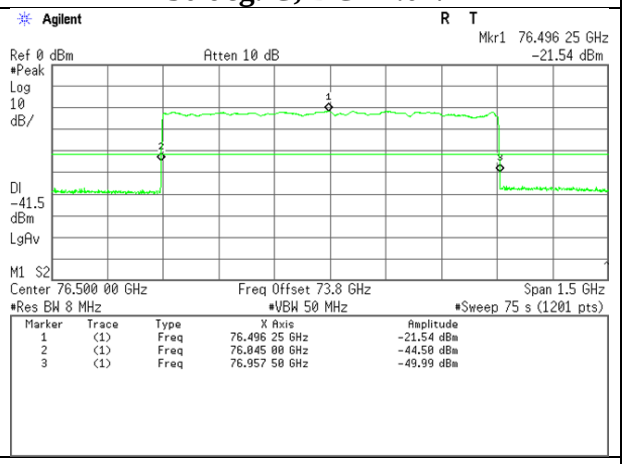
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

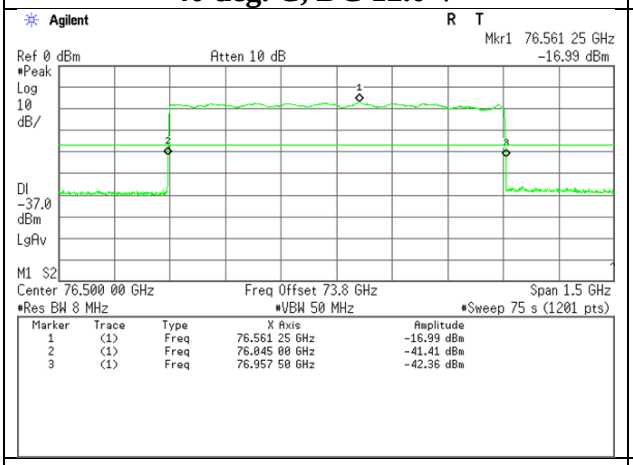
60 deg. C, DC 12.0 V



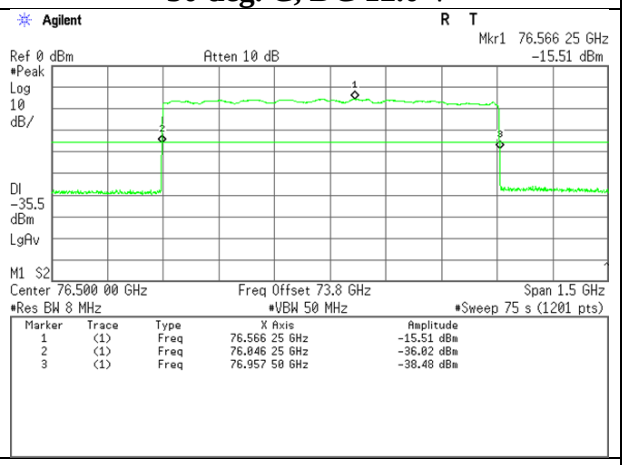
50 deg. C, DC 12.0 V



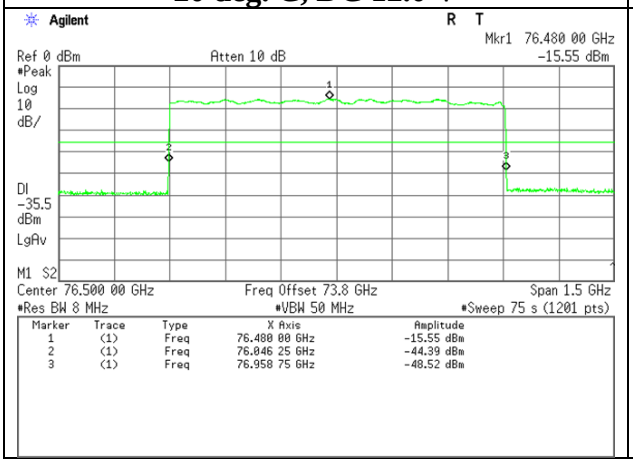
40 deg. C, DC 12.0 V



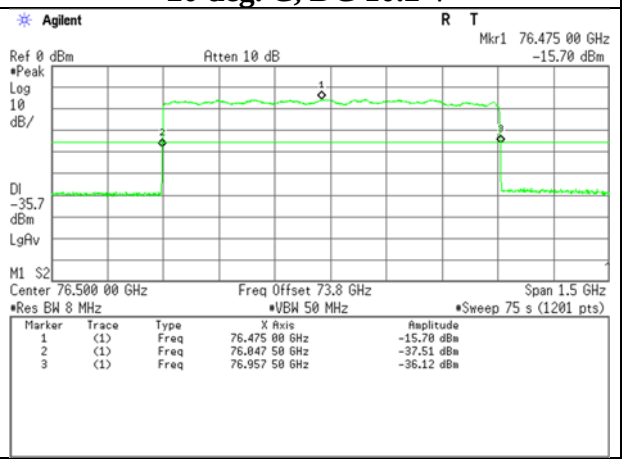
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

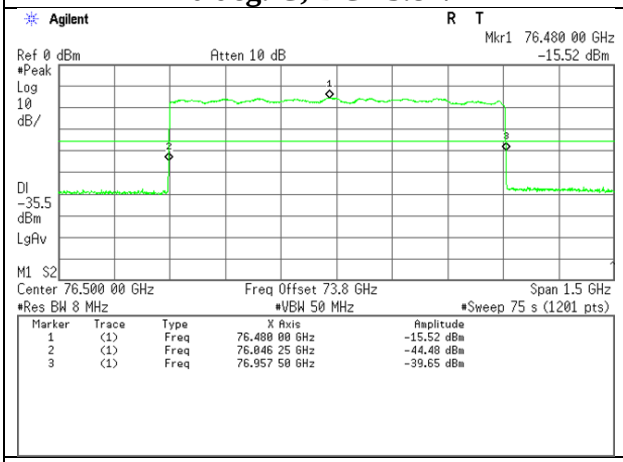


20 deg. C, DC 10.2 V

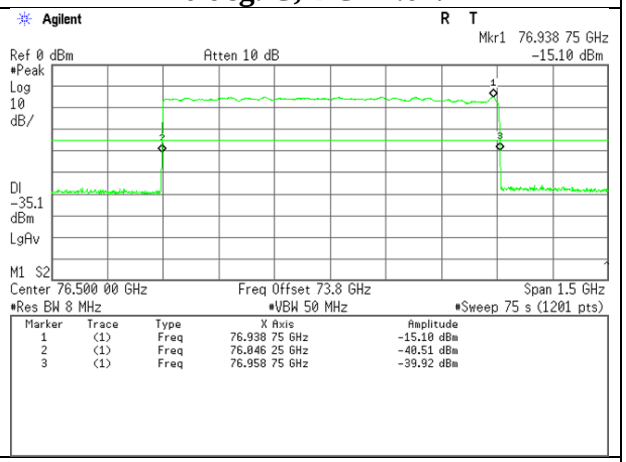


Frequency Stability

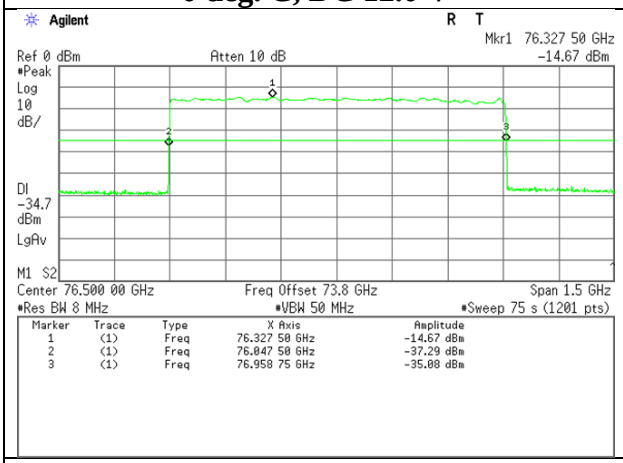
20 deg. C, DC 13.8 V



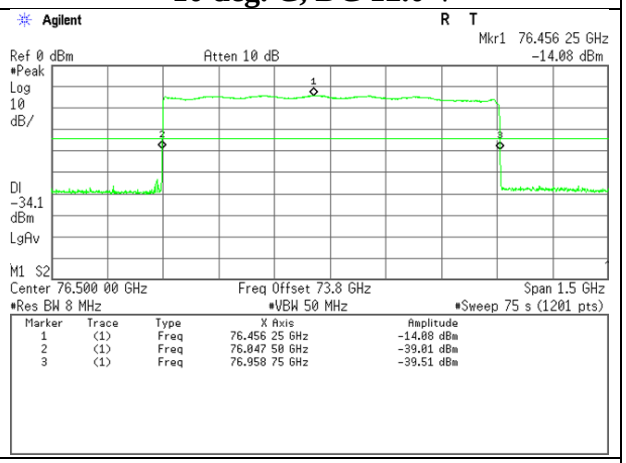
10 deg. C, DC 12.0 V



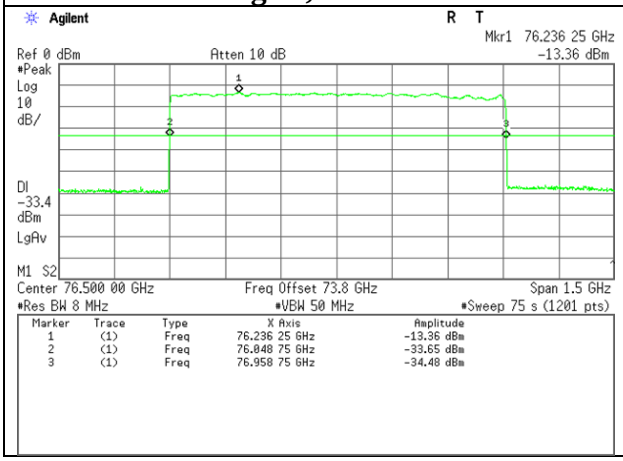
0 deg. C, DC 12.0 V



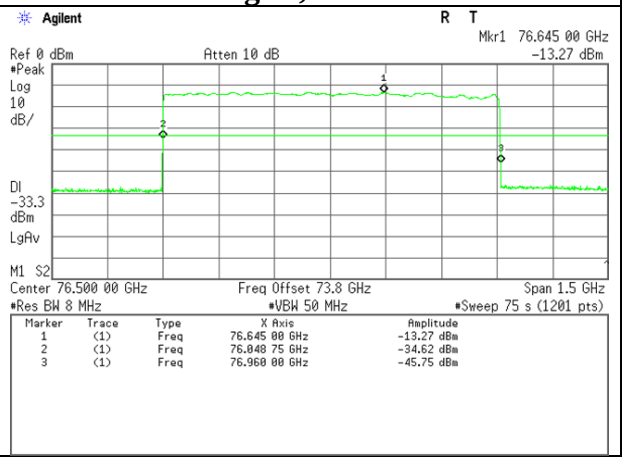
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

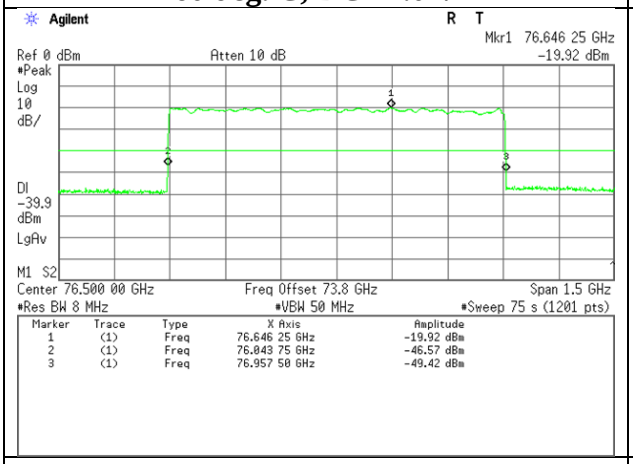
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FMC 2 ch 2

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.044	76.958	Customer requested temperature
50	12.0	76.045	76.956	
40	12.0	76.045	76.958	
30	12.0	76.046	76.958	
20	12.0	76.048	76.958	
20	10.2	76.046	76.959	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.046	76.959	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.044	76.958	
0	12.0	76.048	76.959	
-10	12.0	76.048	76.959	
-20	12.0	76.048	76.960	
-30	12.0	76.049	76.959	

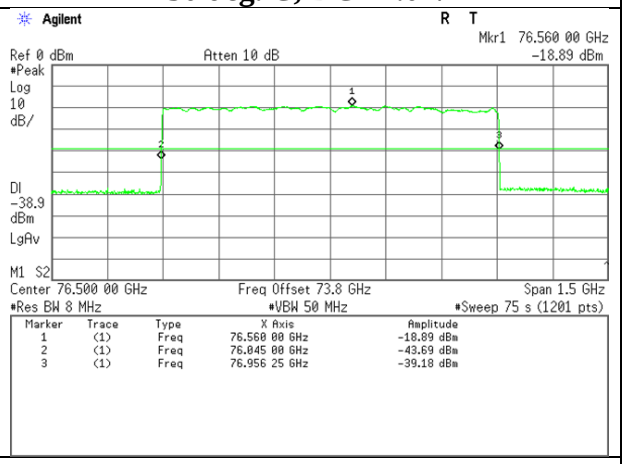
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

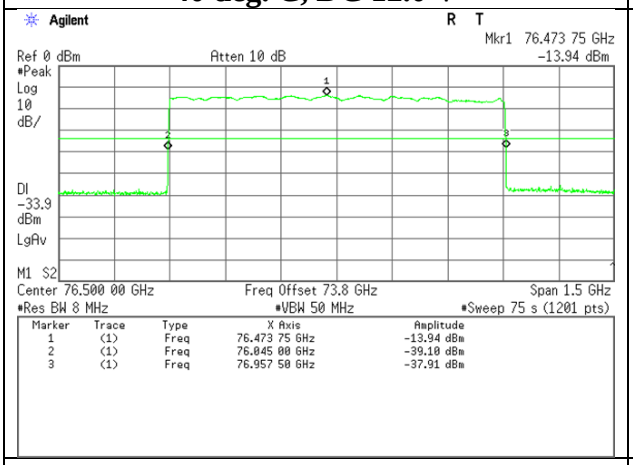
60 deg. C, DC 12.0 V



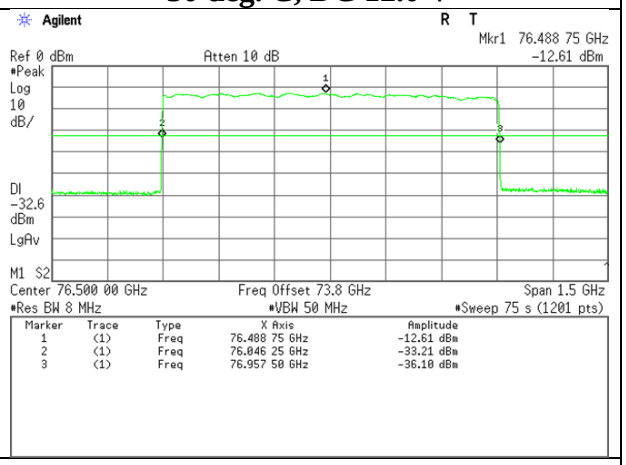
50 deg. C, DC 12.0 V



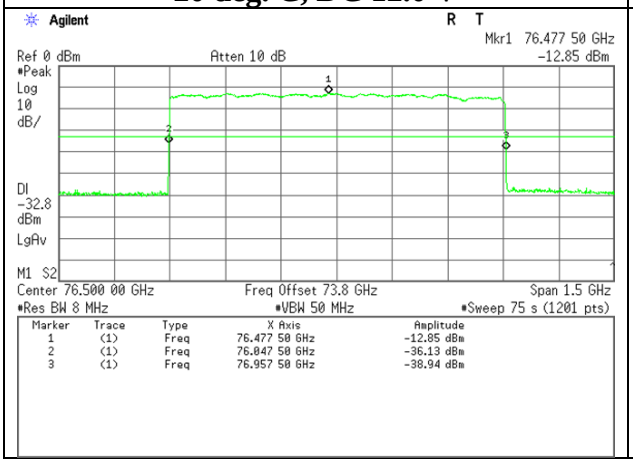
40 deg. C, DC 12.0 V



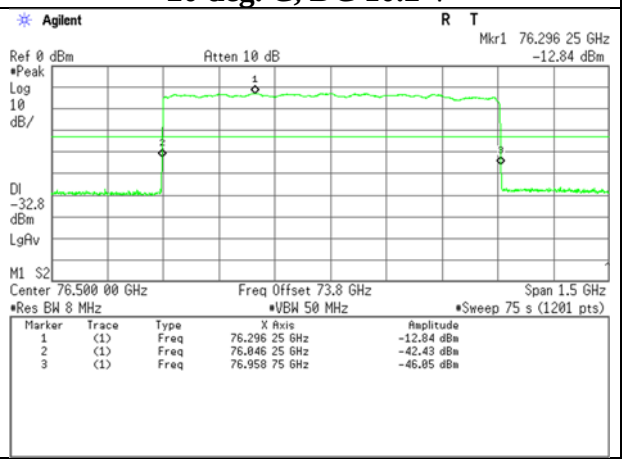
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

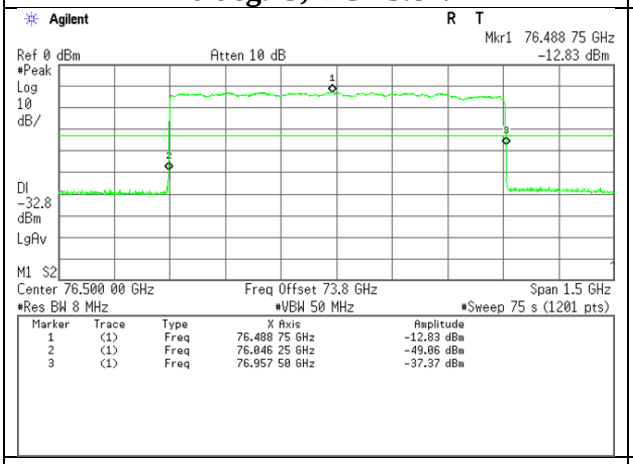


20 deg. C, DC 10.2 V

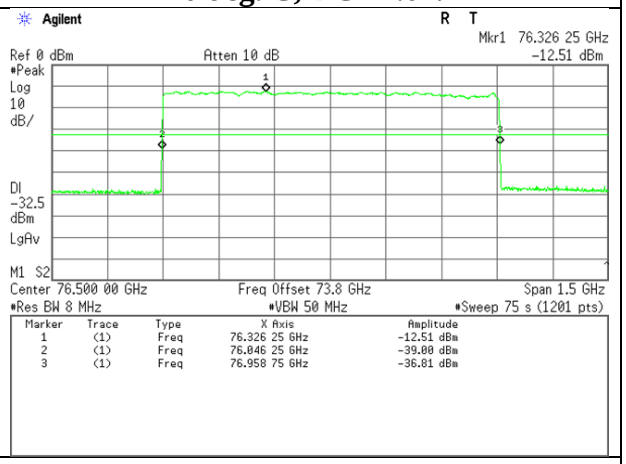


Frequency Stability

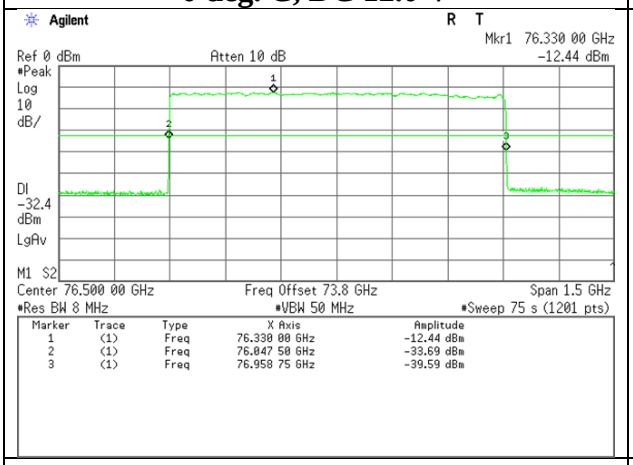
20 deg. C, DC 13.8 V



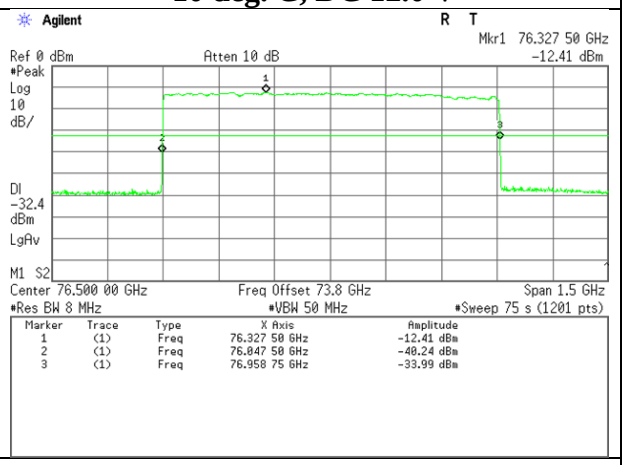
10 deg. C, DC 12.0 V



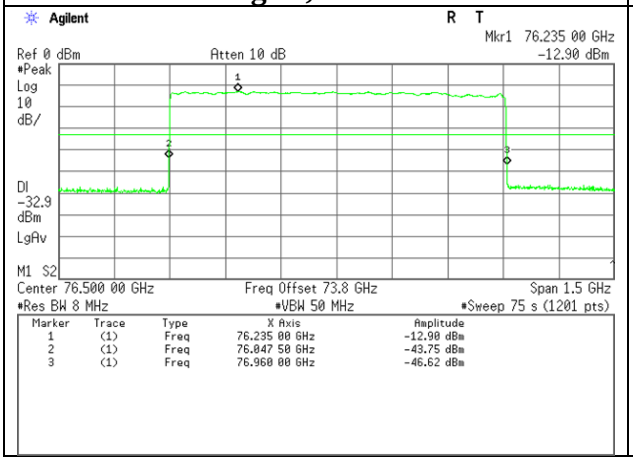
0 deg. C, DC 12.0 V



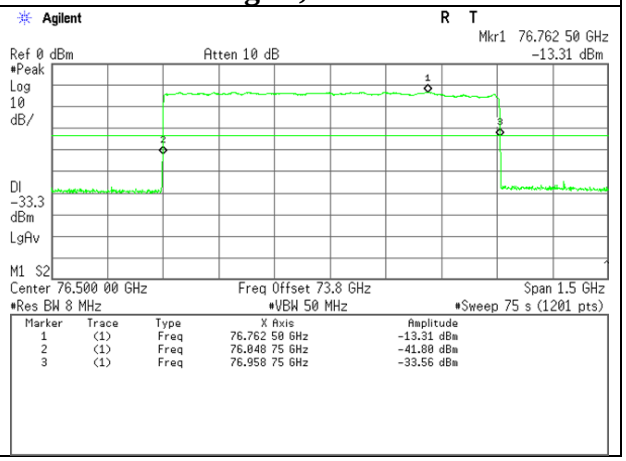
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

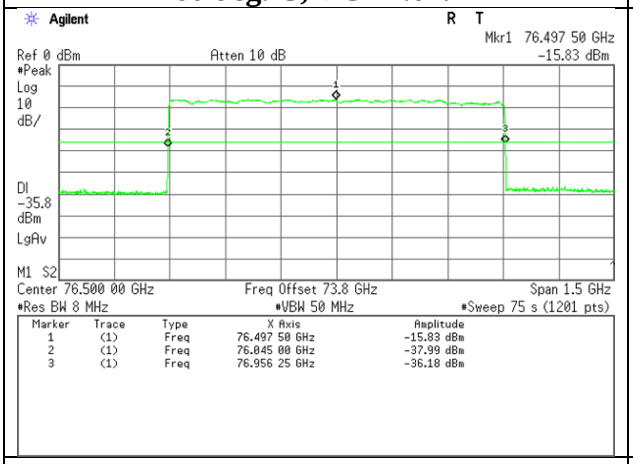
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx FMC 2 ch 3

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.045	76.956	Customer requested temperature
50	12.0	76.045	76.958	
40	12.0	76.045	76.958	
30	12.0	76.047	76.959	
20	12.0	76.046	76.958	
20	10.2	76.046	76.958	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.046	76.958	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.046	76.959	
0	12.0	76.048	76.959	
-10	12.0	76.048	76.959	
-20	12.0	76.048	76.960	
-30	12.0	76.049	76.959	

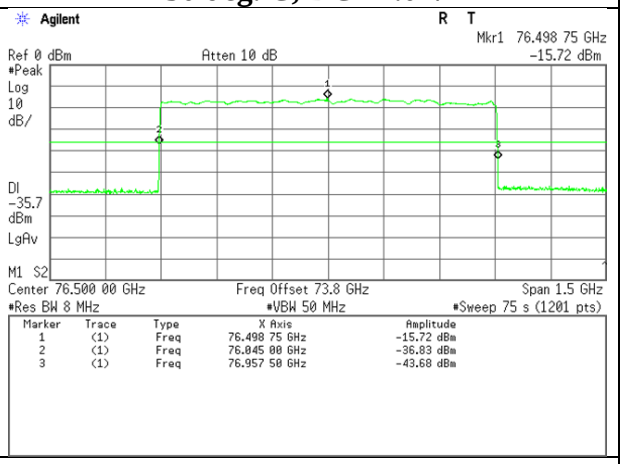
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

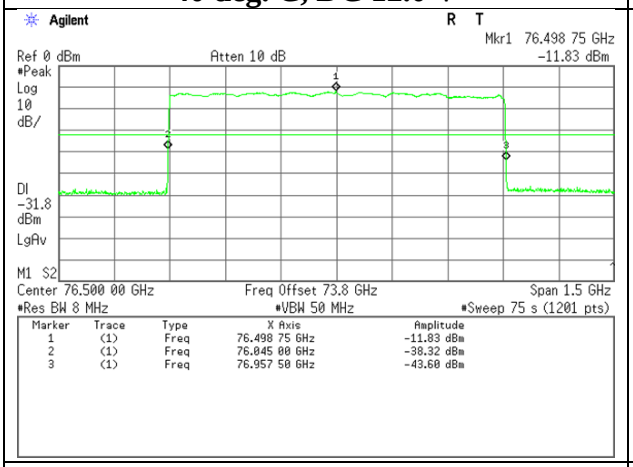
60 deg. C, DC 12.0 V



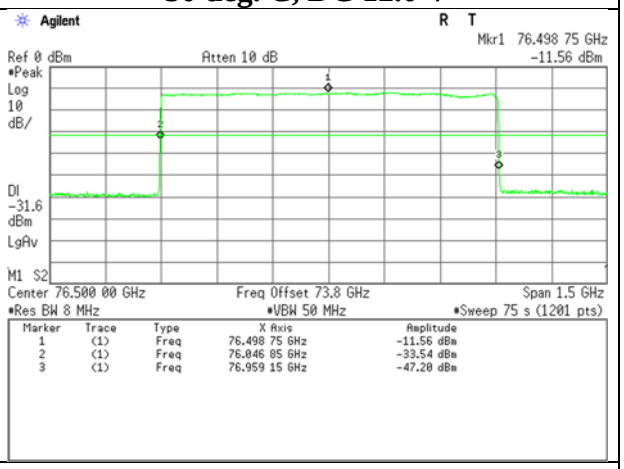
50 deg. C, DC 12.0 V



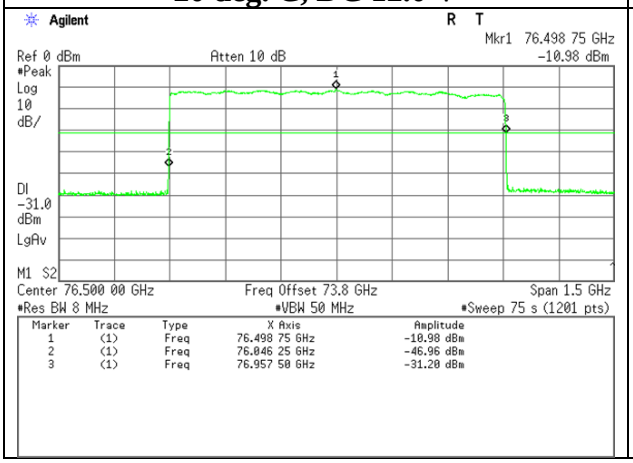
40 deg. C, DC 12.0 V



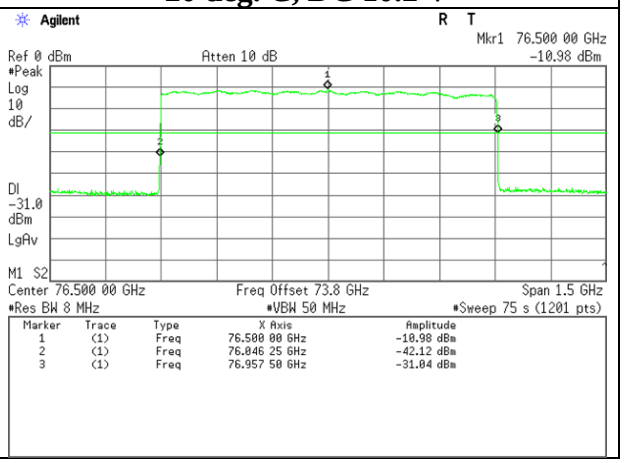
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

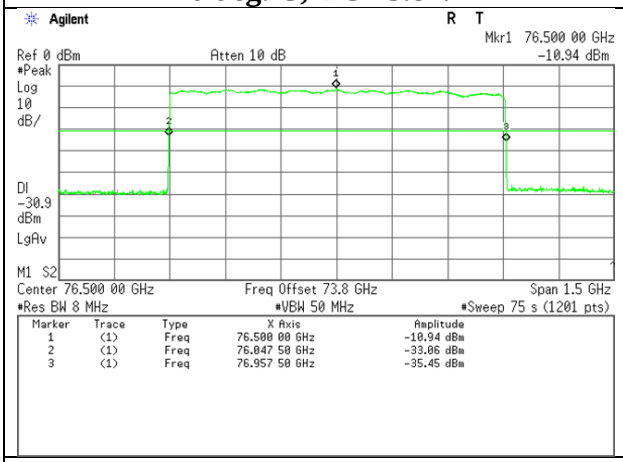


20 deg. C, DC 10.2 V

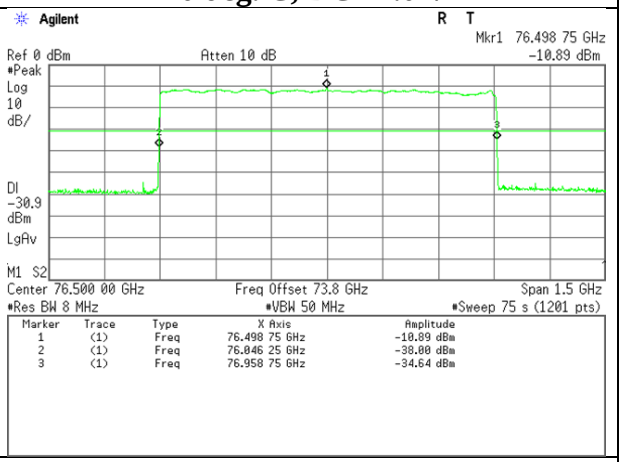


Frequency Stability

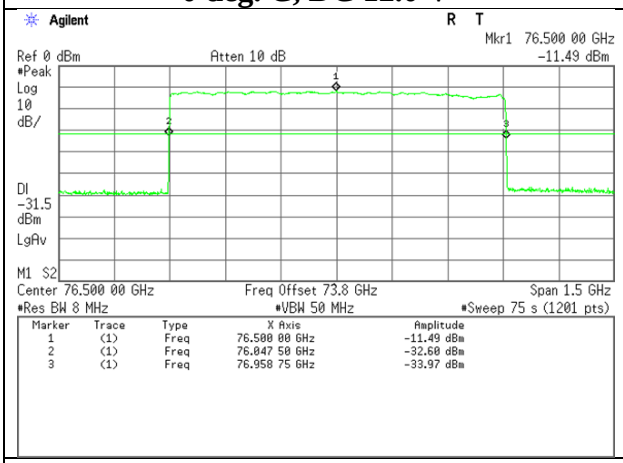
20 deg. C, DC 13.8 V



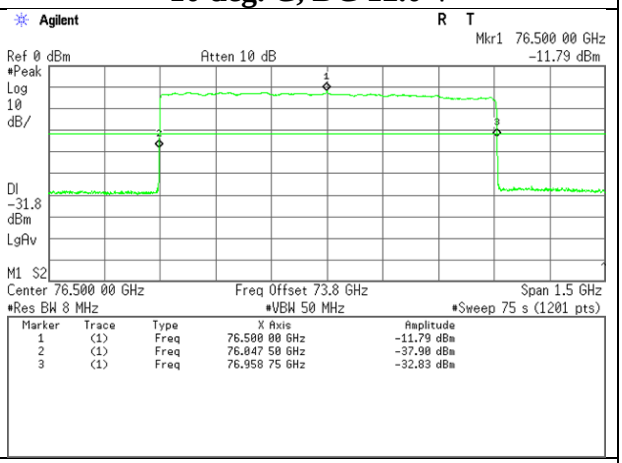
10 deg. C, DC 12.0 V



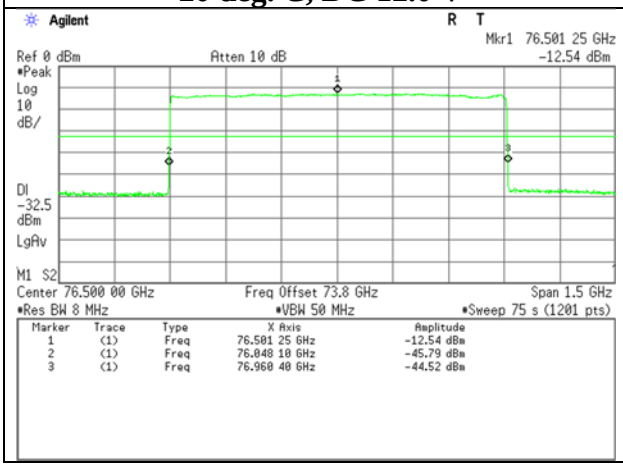
0 deg. C, DC 12.0 V



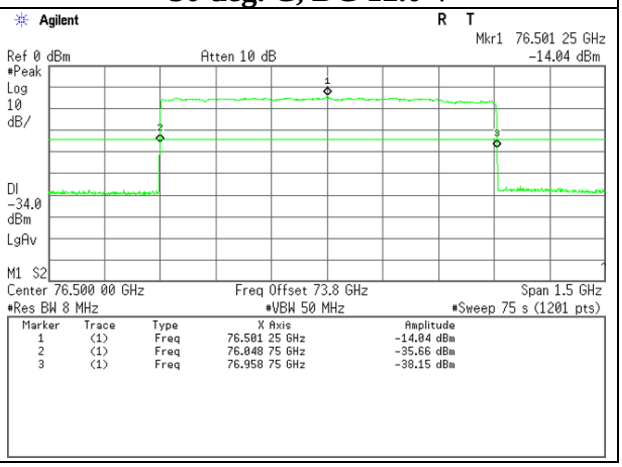
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

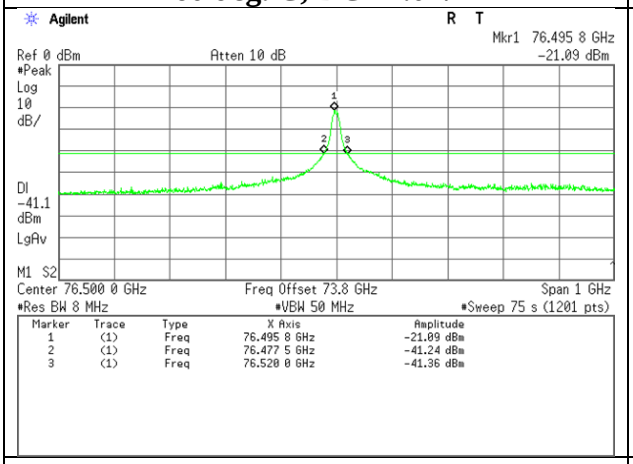
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx CW ch 1

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.478	76.520	Customer requested temperature
50	12.0	76.478	76.519	
40	12.0	76.478	76.519	
30	12.0	76.488	76.511	
20	12.0	76.480	76.520	
20	10.2	76.480	76.518	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.481	76.518	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.482	76.524	
0	12.0	76.482	76.524	
-10	12.0	76.482	76.526	
-20	12.0	76.481	76.525	
-30	12.0	76.481	76.524	

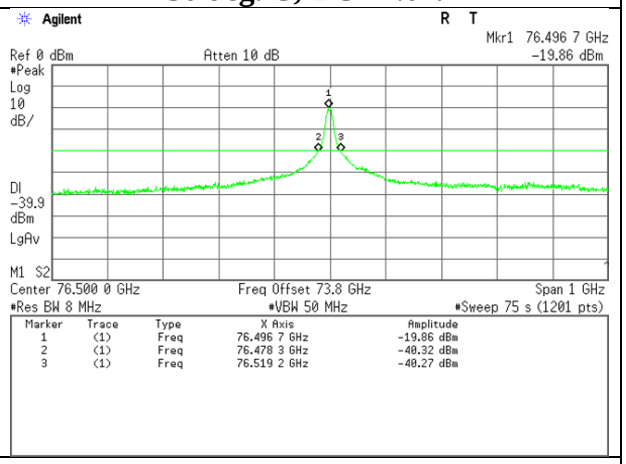
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

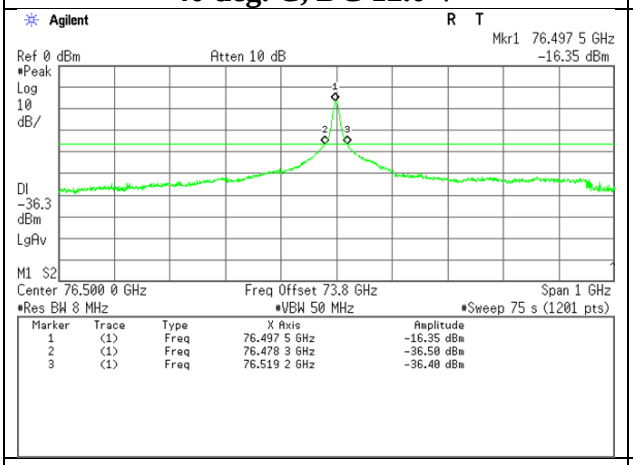
60 deg. C, DC 12.0 V



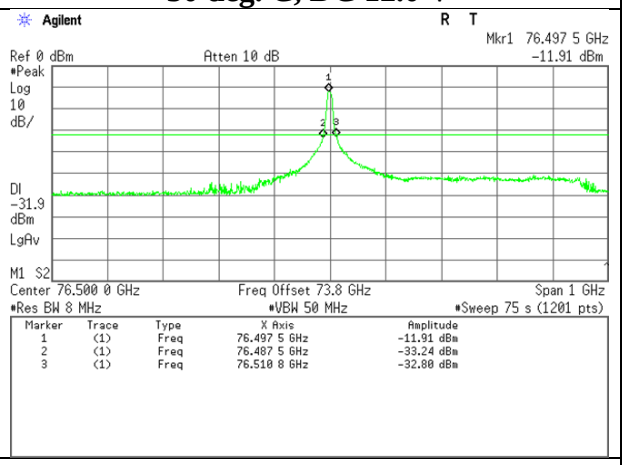
50 deg. C, DC 12.0 V



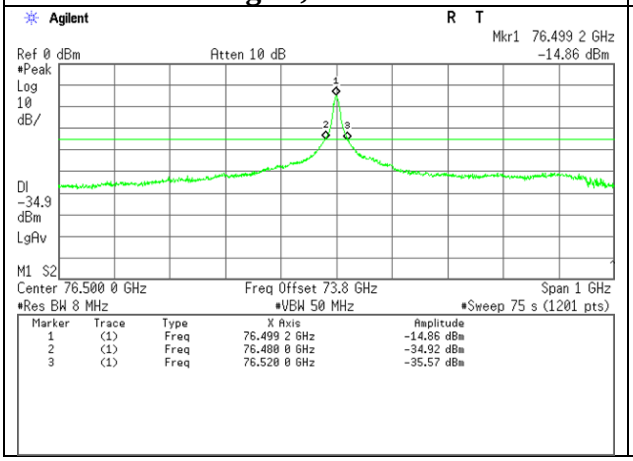
40 deg. C, DC 12.0 V



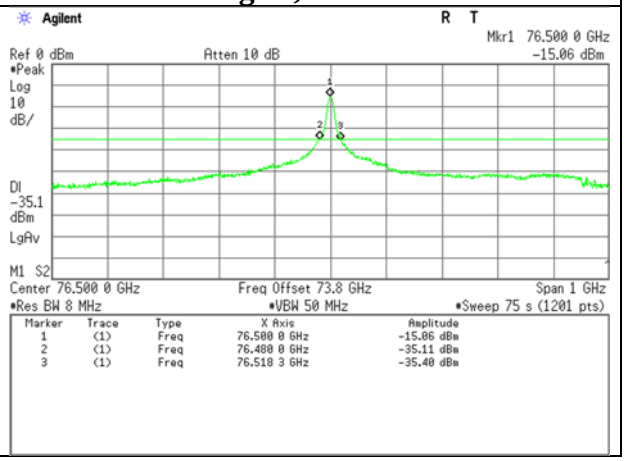
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

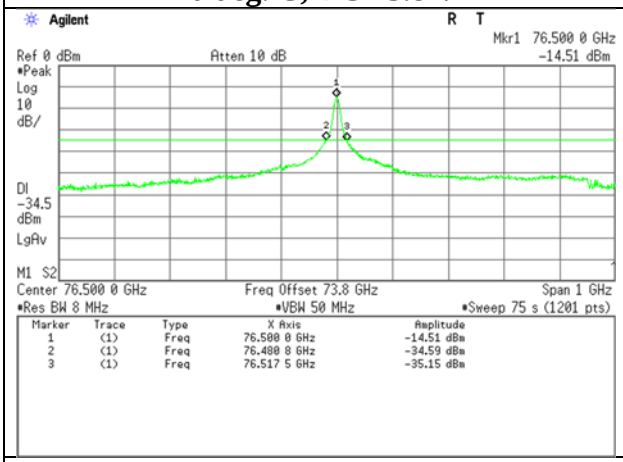


20 deg. C, DC 10.2 V

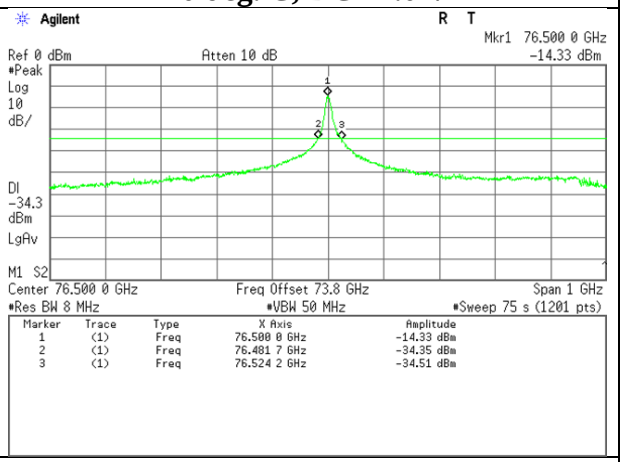


Frequency Stability

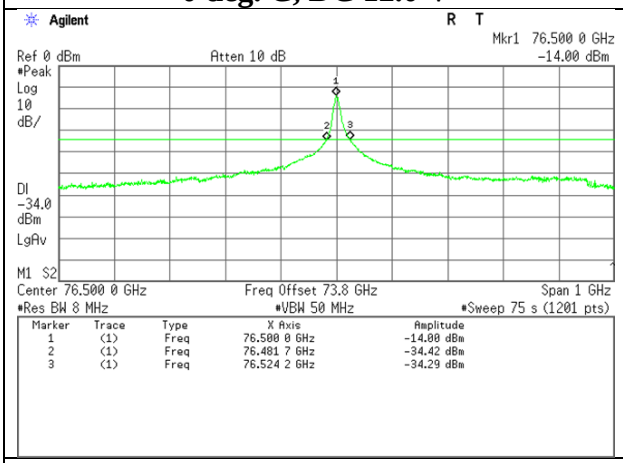
20 deg. C, DC 13.8 V



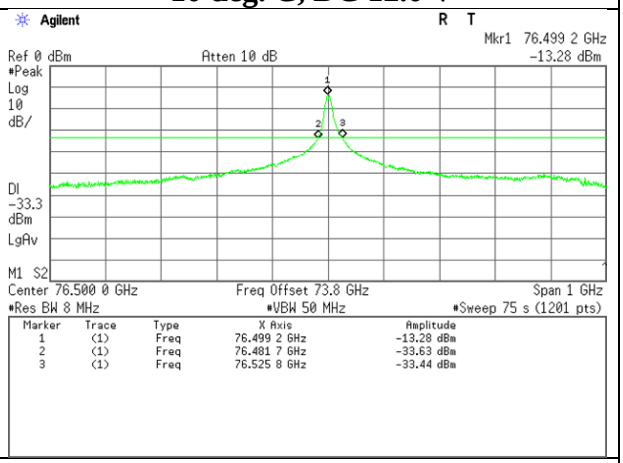
10 deg. C, DC 12.0 V



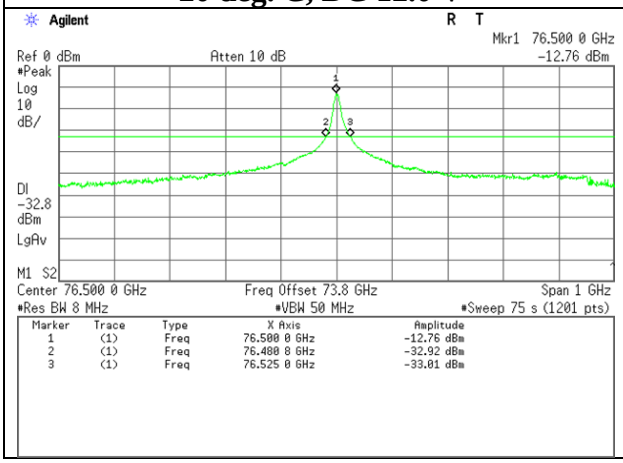
0 deg. C, DC 12.0 V



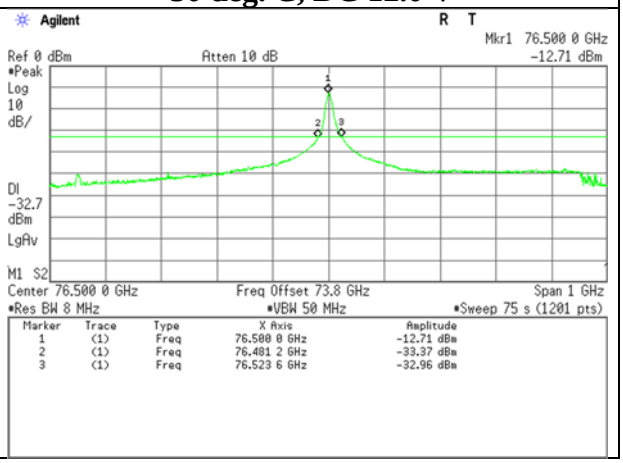
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

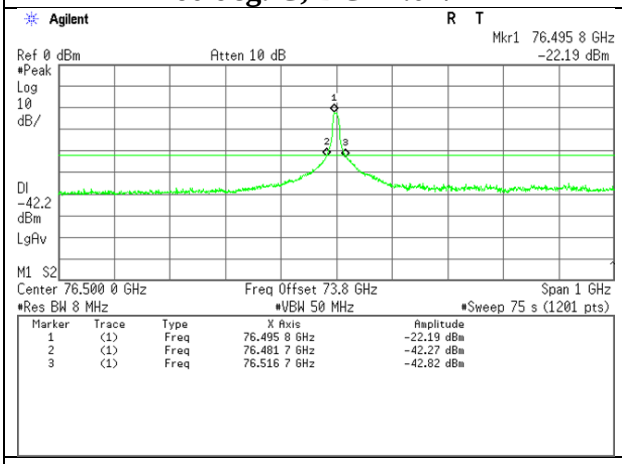
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx CW ch 2

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.482	76.517	Customer requested temperature
50	12.0	76.483	76.515	
40	12.0	76.483	76.516	
30	12.0	76.483	76.518	
20	12.0	76.484	76.518	
20	10.2	76.484	76.516	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.483	76.516	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.484	76.518	
0	12.0	76.485	76.519	
-10	12.0	76.486	76.519	
-20	12.0	76.481	76.519	
-30	12.0	76.485	76.519	

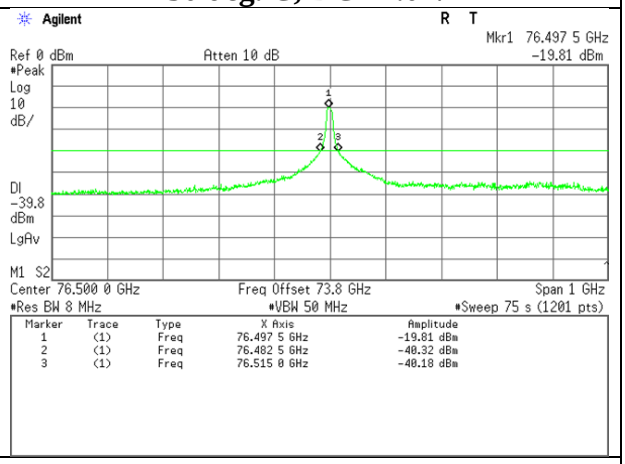
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

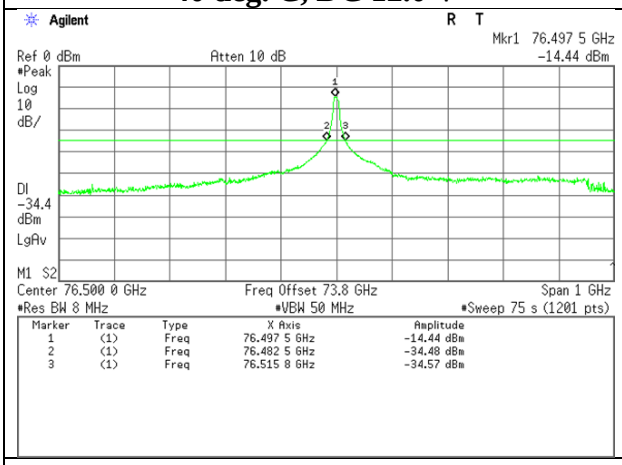
60 deg. C, DC 12.0 V



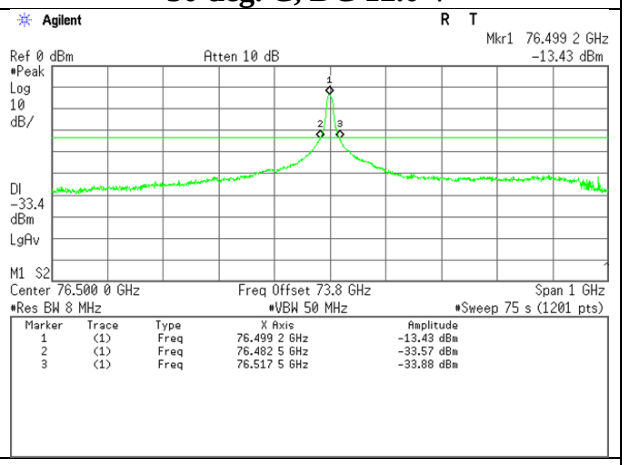
50 deg. C, DC 12.0 V



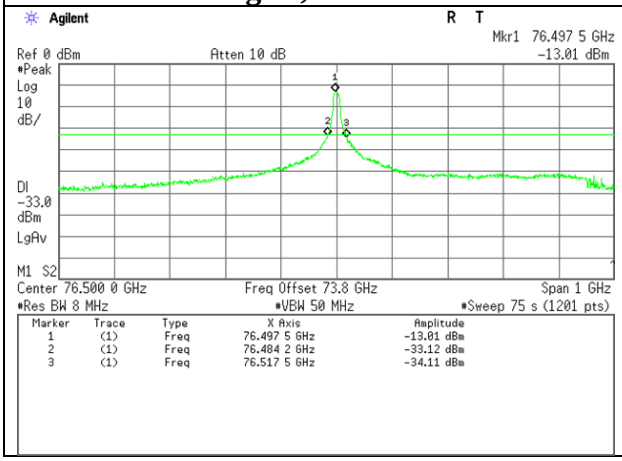
40 deg. C, DC 12.0 V



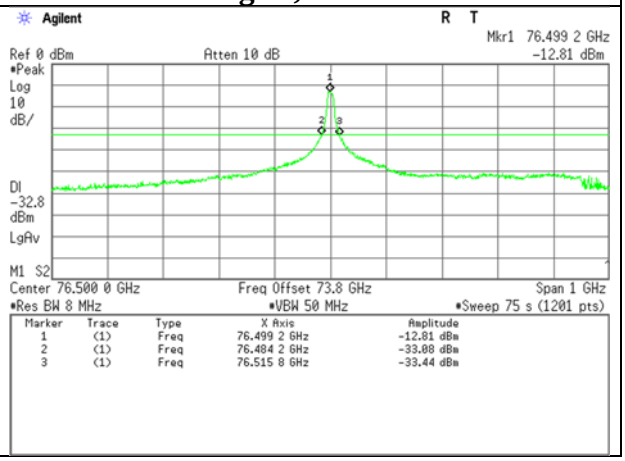
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

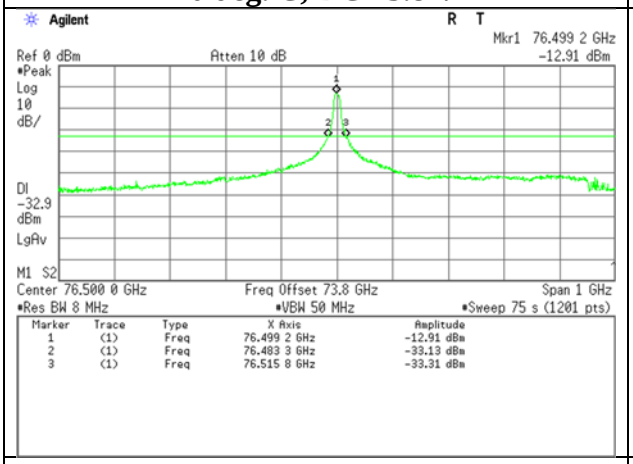


20 deg. C, DC 10.2 V

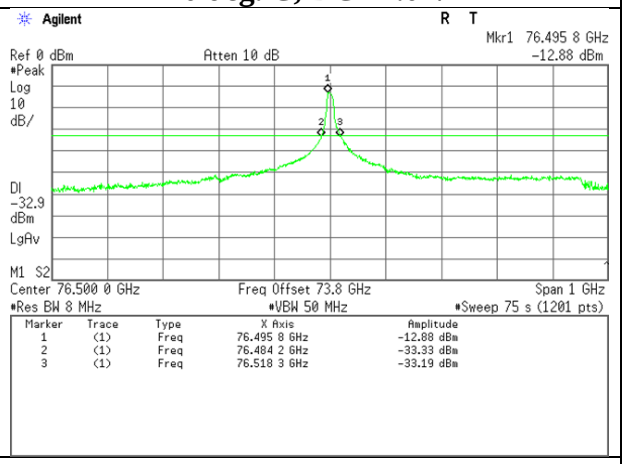


Frequency Stability

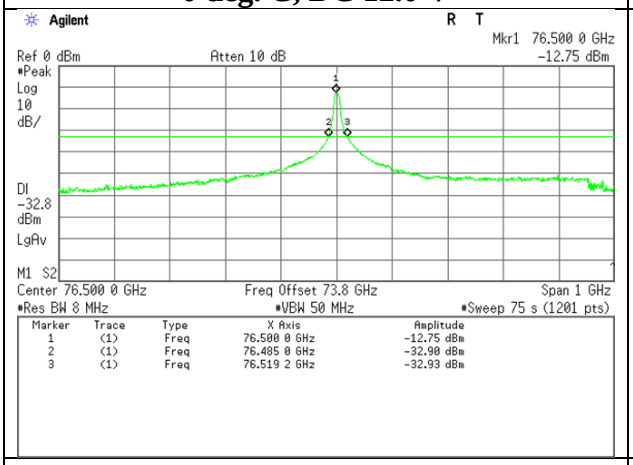
20 deg. C, DC 13.8 V



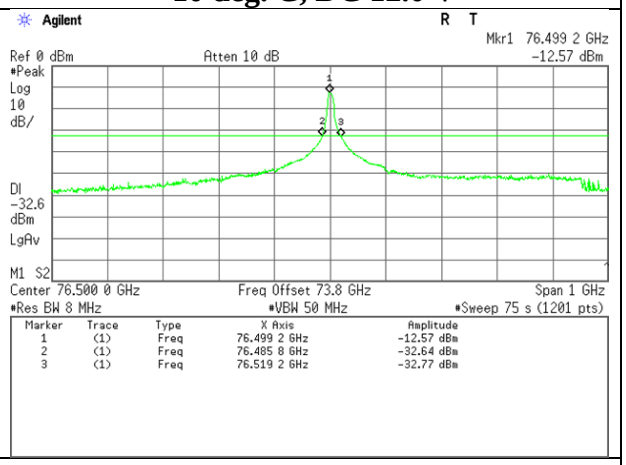
10 deg. C, DC 12.0 V



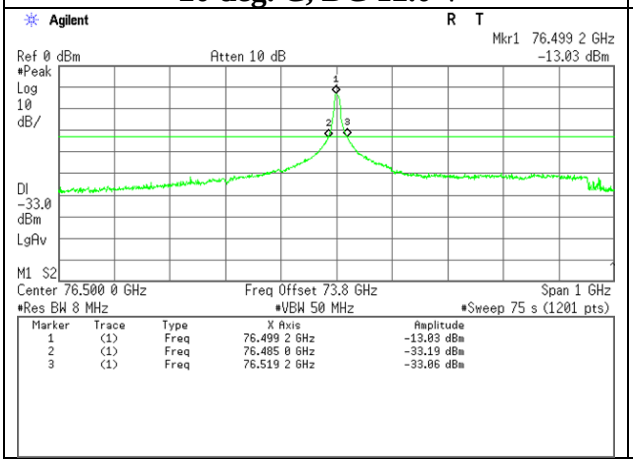
0 deg. C, DC 12.0 V



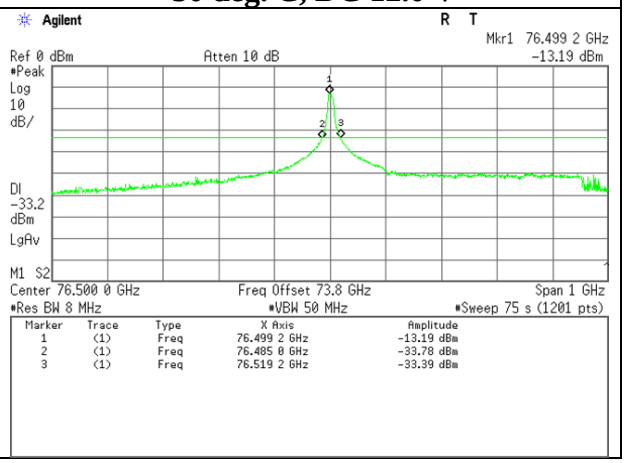
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



Frequency Stability

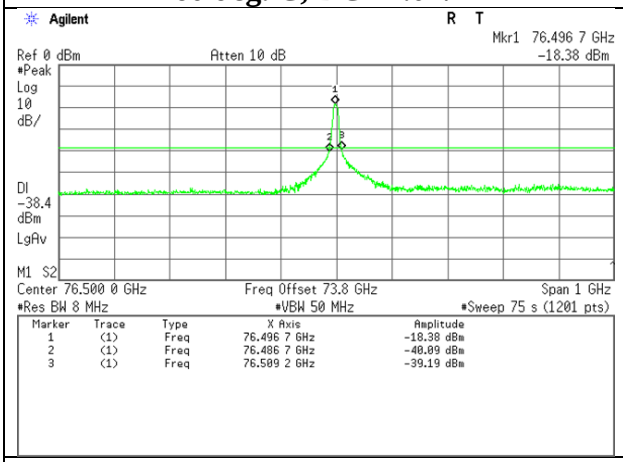
Report No.	13408006H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 13, 2020
Temperature / Humidity	23 deg. C / 52 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx CW ch 3

Test Condition		Measured -20 dBc Frequency		Remarks
Temperature [deg. C]	Power Supply [V]	Lower Result [GHz]	Upper Result [GHz]	
60	12.0	76.487	76.509	Customer requested temperature
50	12.0	76.488	76.510	
40	12.0	76.488	76.509	
30	12.0	76.488	76.511	
20	12.0	76.489	76.511	
20	10.2	76.488	76.512	85 % of the minimum operating voltage, DC 12V * 0.85
20	13.8	76.488	76.512	115 % of the maximum operating voltage, DC 12 V * 1.15
10	12.0	76.489	76.511	
0	12.0	76.490	76.512	
-10	12.0	76.490	76.513	
-20	12.0	76.489	76.513	
-30	12.0	76.490	76.513	

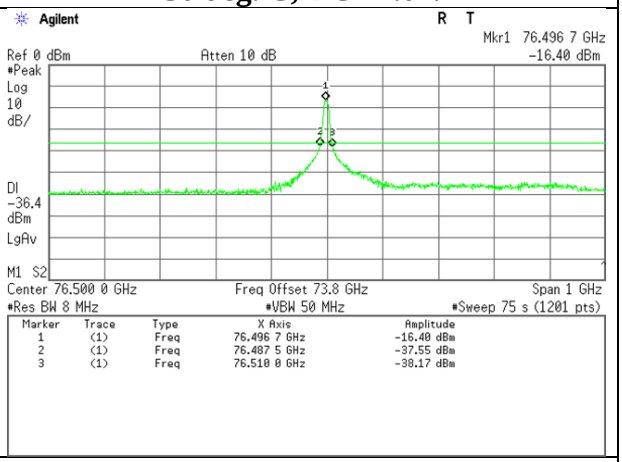
Fundamental emissions were contained within the frequency band 76 GHz to 77 GHz during all conditions of operation.

Frequency Stability

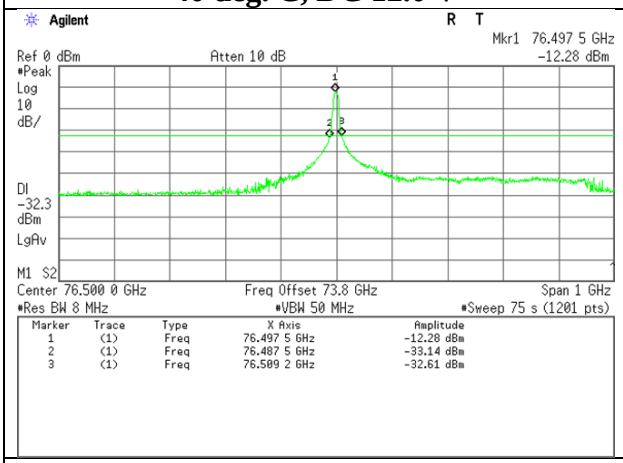
60 deg. C, DC 12.0 V



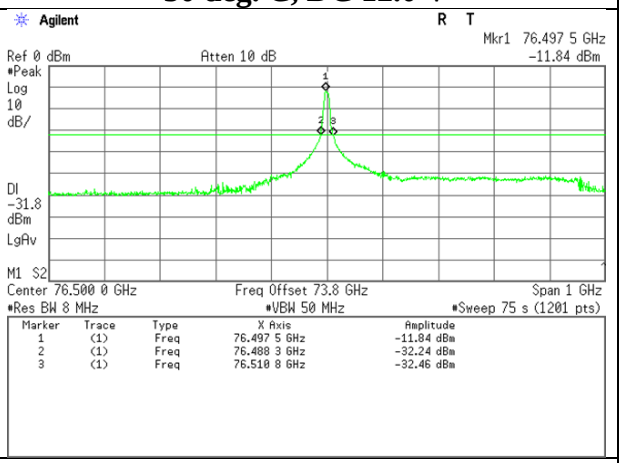
50 deg. C, DC 12.0 V



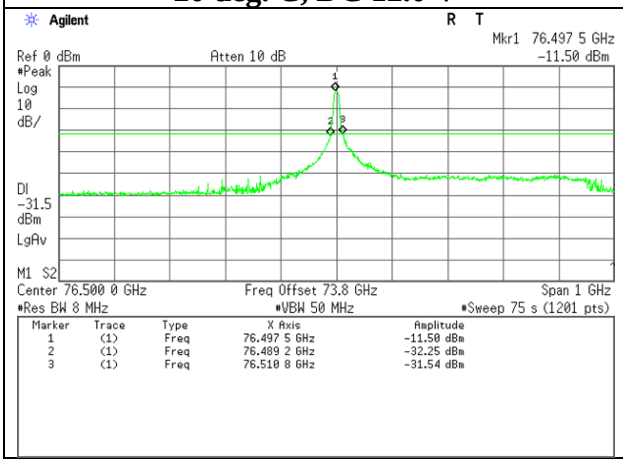
40 deg. C, DC 12.0 V



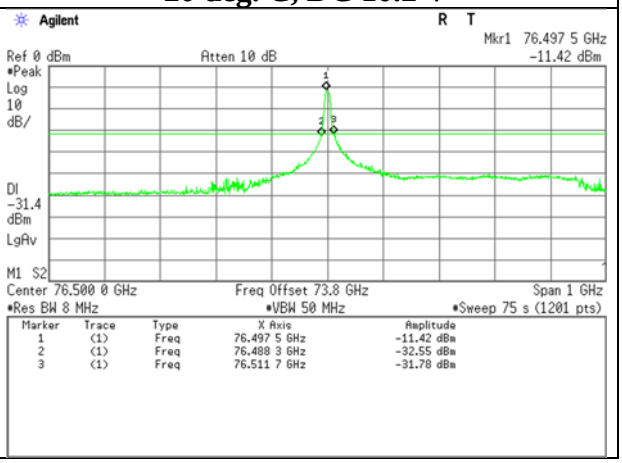
30 deg. C, DC 12.0 V



20 deg. C, DC 12.0 V

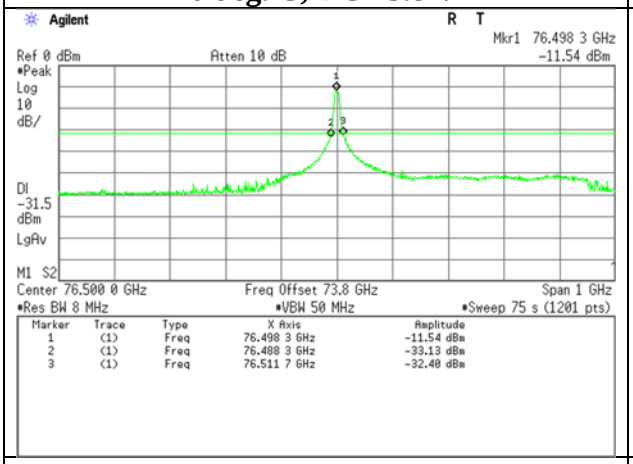


20 deg. C, DC 10.2 V

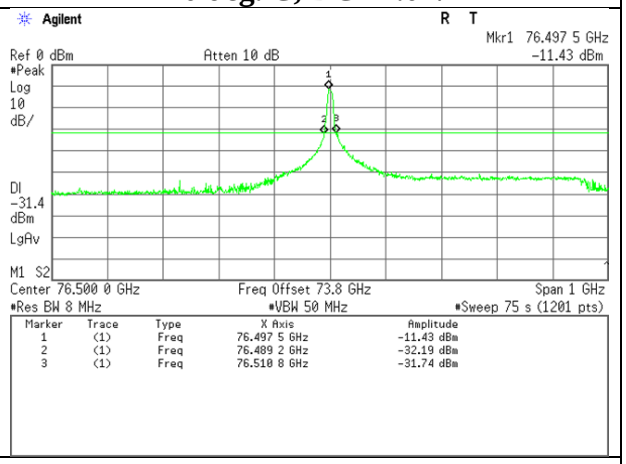


Frequency Stability

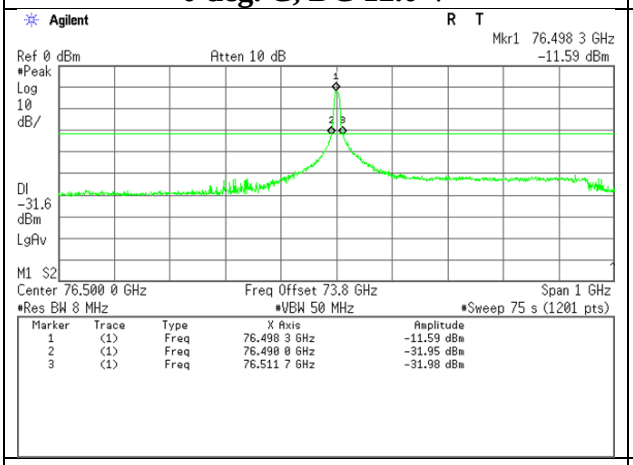
20 deg. C, DC 13.8 V



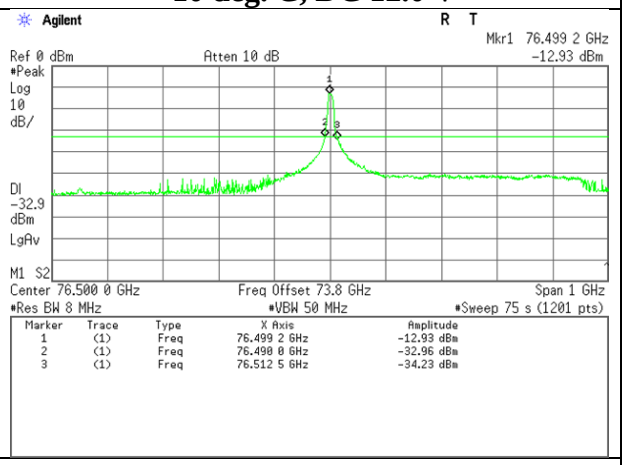
10 deg. C, DC 12.0 V



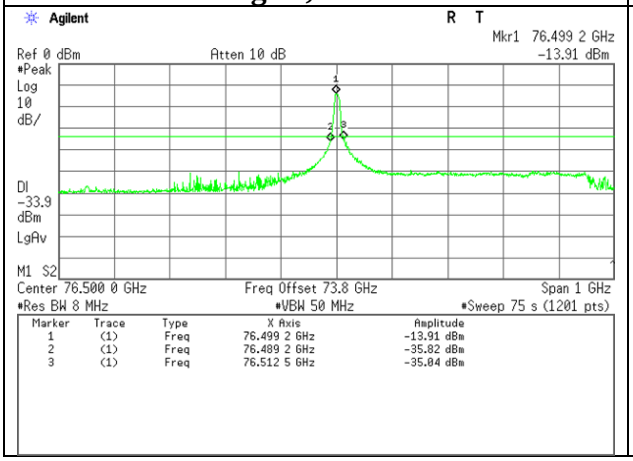
0 deg. C, DC 12.0 V



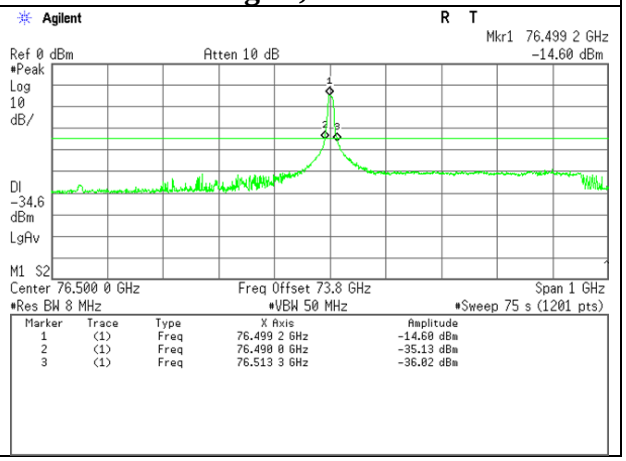
-10 deg. C, DC 12.0 V



-20 deg. C, DC 12.0 V



-30 deg. C, DC 12.0 V



APPENDIX 2: Test instruments

Test equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/25/2020	24
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/07/2020	12
RE	MMM-10	141545	DIGITAL HiTESTER	Hioki	3805	51201148	01/06/2020	12
RE	MJM-26	142227	Measure	KOMELON	KMC-36	-	-	-
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/04/2019	24
RE	MHA-31	142041	Horn Antenna	Oshima Prototype Engineering Co.	A16-187	1	09/27/2019	12
RE	MPA-25	159919	Power Amplifier	SAGE Millimeter, Inc.	SBP-4035033018-2F2F-S1	12559-01	06/30/2020	12
RE	MCC-220	151897	Microwave Cable	Huber+Suhner	SF101EA/11PC24/11PC24/2.5M	SN MY1726/1EA	04/13/2020	12
RE	MHA-35	180544	Horn Antenna	SAGE Millimeter, Inc.	SAZ-2410-10-S1	17343-01	06/24/2020	12
RE	MHF-29	154635	High Pass Filter 83 GHz - 110 GHz	Oshima Prototype Engineering Co.	A17-016	1	05/26/2020	12
RE	MMX-08	186077	Wave guide Harmonic Mixer	Keysight Technologies Inc	M1971W	MY56390146	05/25/2020	12
RE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	03/04/2020	12
RE	MSA-19	182484	Signal Analyzer	Keysight Technologies Inc	N9030B	MY57143159	06/24/2020	12
RE	MMX-05	142050	Block Downconverter	EMC Instruments Corporation	PS-X30-W10117A	13715	02/19/2020	12
RE	MCC-67	141329	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	04/02/2020	12
RE	MHA-24	142036	Horn Antenna	Custom Microwave Inc.	HO6R	-	09/27/2019	12
RE	MPA-29	176027	D-Band Low Noise Amplifier	SAGE Millimeter, Inc.	SBL-1141741860-0606-EI	15235-01	12/23/2019	12
RE	MMX-03	142049	Harmonic Mixer	OML INC.	M06HWD	D100709-1	11/27/2019	12
RE	MDPLX-01	142026	Diplexer	OML INC.	DPL26	-	11/15/2019	12
RE	MHA-27	142039	Horn Antenna	Custom Microwave Inc.	HO4R	-	09/27/2019	12
RE	MMX-04	142053	Harmonic Mixer	OML INC.	M04HWD	Y100709-1	12/02/2019	12
RE	MCC-135	142032	Microwave Cable	Huber+Suhner	SUCOFLEX102	37511/2	09/11/2019	12
RE	MHA-33	180634	Horn Antenna	SAGE Millimeter, Inc.	SAZ-2410-15-S1	17343-01	06/24/2020	12
RE	MPA-23	142055	Power Amplifier	SAGE Millimeter, Inc.	SBP-5037532015-1515-N1	11599-01	12/19/2019	12
RE	MMX-01	142047	Preselected Millimeter Mixer	Keysight Technologies Inc	11974V-E01	3001A00412	05/25/2020	12
RE	MCC-136	142033	Microwave Cable	Huber+Suhner	SUCOFLEX102	37512/2	09/11/2019	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/18/2020	12
RE	MCC-178	141227	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S305	03/18/2020	12
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MHA-02	141503	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	06/15/2020	12
RE	MHA-04	141505	Horn Antenna 26.5-40GHz	EMCO	3160-10	1140	09/19/2019	12
RE	MHA-21	141508	Horn Antenna 1-18GHz	Schwarzbeck Mess - Elektronik	BBHA9120D	557	05/22/2020	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	650	10/16/2019	12
RE	MCC-246	199563	Microwave Cable	HUBER+SUNER	SF126E/11PC35/11PC35/1000M,5000M	537061/126E / 537072/126E	06/11/2020	12
RE	MPA-03	141577	Microwave System Power Amplifier	Keysight Technologies Inc	83050A	MY39500610	10/01/2019	12
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/05/2020	12

Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess - Elektronik	VHA9103+BBA9106	1302	08/24/2019	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	03/24/2020	12
RE	MLA-23	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess - Elektronik	VUSLP9111B	9111B-192	08/24/2019	12
RE	MTR-10	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	03/10/2020	12
RE	MCC-113	141217	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W/SFM141/ 421-010/ sucoform141-PE/ RFM-E121(SW)	-/04178	06/18/2020	12
RE	MLPA-01	141254	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	10/04/2019	12
RE	MCC-143	141413	Coaxial Cable	UL Japan	-	-	06/18/2020	12
RE	MCH-04	141429	Temperature and Humidity Chamber	ESPEC	PL-2KP	14015723	08/02/2019	12
RE	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/07/2020	12
RE	MPA-31	180607	Power Amplifier	SAGE Millimeter, Inc.	SBP-7531142515-1010-E1	17343-01	10/11/2019	12
RE	MHF-15	142042	High Pass Filter 81-110GHz	AmTechs Corporation	HPF-10-778030	201	07/14/2020	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/10/2020	12
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/07/2020	12
RE	MMM-03	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/18/2020	12
RE	MJM-25	142226	Measure	KOMELON	KMC-36	-	-	-
RE	MAEC-01-SVSWR	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/16/2019	24

***Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item: RE: Radiated Emission test