

DA28

Test Report reusing data

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1. Introduction section

The original model (FCC ID: JOYKA73) and the variant model (FCC ID: JOYDA28) had identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GSM/UMTS/LTE. Based on their similarity, the FCC part 15C (DTS, DSS) and Part 22H(PCE) and Part 24 E(PCE) test data issued for original model also apply for the variant model.

The applicant takes full responsibility that the test data as referenced in section 4 below represent compliance for this FCC ID (FCC ID: JOYDA28).

In the Spot check report, we checked the transmission method which was the highest output last time in each FCC part. Excluded from spot check the Bluetooth and WCDMA850 which was low in output.

2. Difference Section

For DA28, this model is a model that changed the RFID part of KA73 (FCC ID: JOYKA73).
It is not changed other radio parts. The details of difference can be found in the Attestation letter.

The product specification is outlined in the following table:

FCC ID		JOYKA73	JOYDA28
Wireless Tech.	Mode	Frequency (MHz)	Frequency (MHz)
GSM	GSM Voice GPRS (GMSK)	850/1900	850/1900
UMTS	AMR/RCM12.2kbps HSDPA/HSUPA/DC-HSDPA	B5	B5
Wi-Fi	11b/g/n (HT20)	2412-2462	2412-2462
Bluetooth	V4.1+EDR	2402-2480	2402-2480
NFC	ASK	13.56	13.56

3. Spot Check Verification Data Section

3.1 RF Conducted Power

GSM Conducted Powers

Band	Channel	Frequency [MHz]	Maximum Burst-Averaged Output Power [dBm]		
			Voice GSM CS 1slot		
			FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
GSM 850	128	824.2	32.74	32.90	-0.16
	190	836.6	32.85	33.00	-0.15
	251	848.8	32.59	33.20	-0.61
PCS 1900	512	1850.2	29.98	29.50	0.48
	661	1880.0	29.84	29.50	0.34
	810	1909.8	29.73	29.50	0.23
Band	Channel	Frequency [MHz]	Calculated Maximum Frame-Averaged Output Power [dBm]		
			Voice GSM CS 1slot		
			FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
GSM 850	128	824.2	23.71	23.87	-0.16
	190	836.6	23.82	23.97	-0.15
	251	848.8	23.56	24.17	-0.61
PCS 1900	512	1850.2	20.95	20.47	0.48
	661	1880.0	20.81	20.47	0.34
	810	1909.8	20.70	20.47	0.23

WLAN Conducted Powers

[IEEE 802.11b]**Measurement result**

[FCC ID: JOYKA73]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	3.07	10.53	13.60	22.909	≤ 1000	PASS
Middle	2437	3.23	10.53	13.76	23.768	≤ 1000	PASS
High	2462	3.17	10.53	13.70	23.442	≤ 1000	PASS

[FCC ID: JOYDA28]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	3.11	10.73	13.84	24.210	≤ 1000	PASS
Middle	2437	2.89	10.73	13.62	23.014	≤ 1000	PASS
High	2462	3.28	10.73	14.01	25.177	≤ 1000	PASS

Comparison of measurement results

Mode	Frequency [MHz]	IEEE 802.11b (2.4 GHz) Conducted Power [dBm]		
		Data Rate 1 [Mbps]		
		FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
802.11b	2412	13.60	13.84	-0.24
	2437	13.76	13.62	0.14
	2462	13.70	14.01	-0.31

IEEE 802.11b Average RF Power

WLAN Conducted Powers

[IEEE 802.11g]

Measurement result

[FCC ID: JOYKA73]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	1.54	10.53	12.07	16.106	≤ 1000	PASS
Middle	2437	1.69	10.53	12.22	16.672	≤ 1000	PASS
High	2462	1.19	10.53	11.72	14.859	≤ 1000	PASS

[FCC ID: JOYDA28]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	1.29	10.73	12.02	15.922	≤ 1000	PASS
Middle	2437	1.00	10.73	11.73	14.894	≤ 1000	PASS
High	2462	1.38	10.73	12.11	16.255	≤ 1000	PASS

Comparison of measurement results

Mode	Frequency [MHz]	802.11g (2.4 GHz) Conducted Power [dBm]		
		Data Rate 6 [Mbps]		
		FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
802.11g	2412	12.07	12.02	0.05
	2437	12.22	11.73	0.49
	2462	11.72	12.11	-0.39

IEEE 802.11g Average RF Power

WLAN Conducted Powers

[IEEE 802.11n (HT20)]

Measurement result

[FCC ID: JOYKA73]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	1.17	10.53	11.70	14.791	≤ 1000	PASS
Middle	2437	1.66	10.53	12.19	16.558	≤ 1000	PASS
High	2462	1.08	10.53	11.61	14.488	≤ 1000	PASS

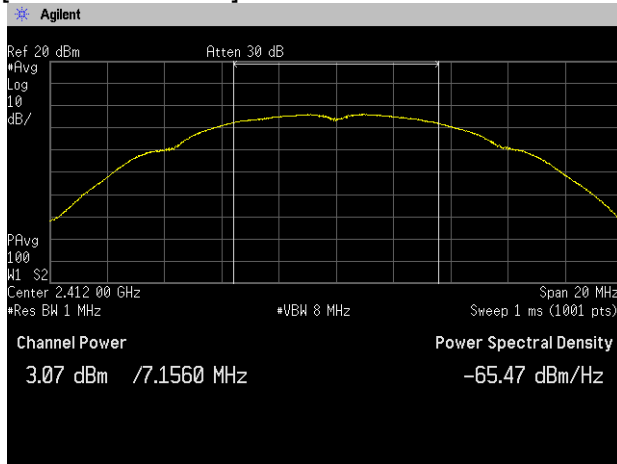
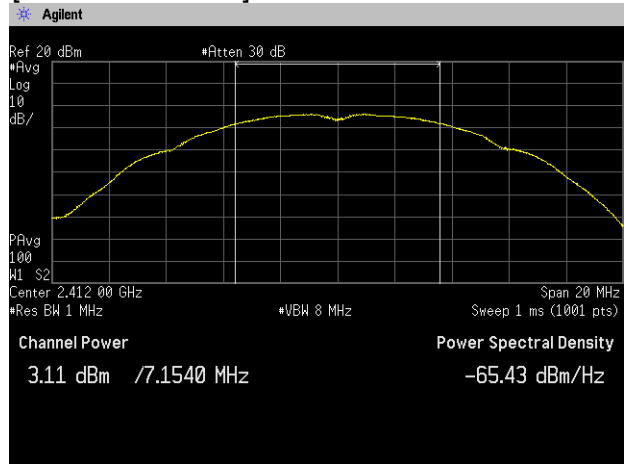
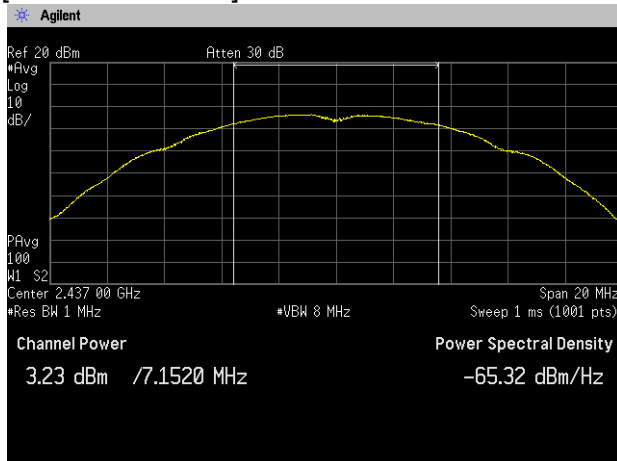
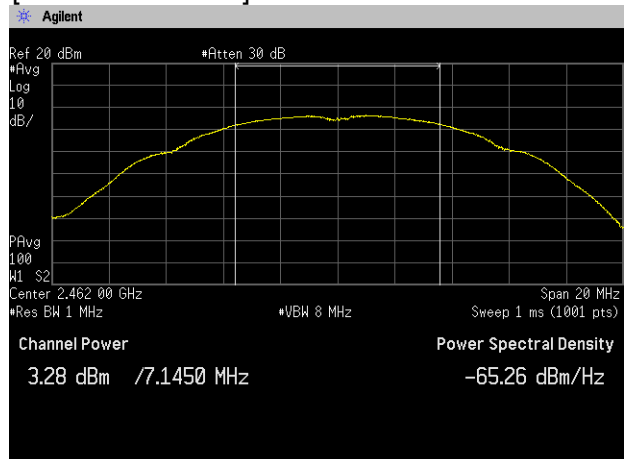
[FCC ID: JOYDA28]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2412	1.30	10.73	12.03	15.959	≤ 1000	PASS
Middle	2437	0.98	10.73	11.71	14.825	≤ 1000	PASS
High	2462	1.08	10.73	11.81	15.171	≤ 1000	PASS

Comparison of measurement results

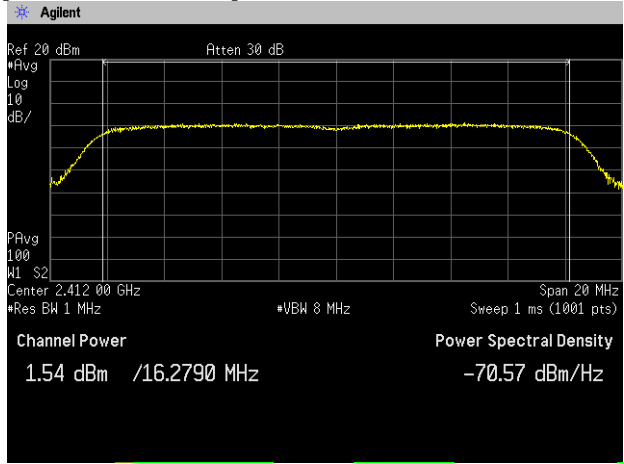
Mode	Frequency [MHz]	802.11n HT20 (2.4 GHz) Conducted Power [dBm]		
		Data Rate 6.5 [Mbps]		
		FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
802.11n (HT20)	2412	11.70	12.03	-0.33
	2437	12.19	11.71	0.48
	2462	11.61	11.81	-0.20

IEEE 802.11n Average RF Power

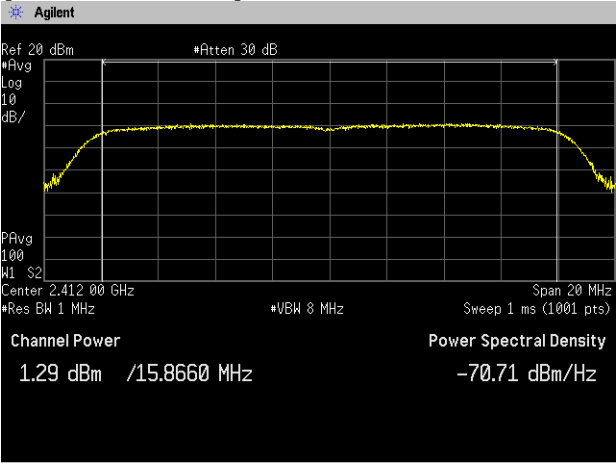
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[IEEE 802.11g]

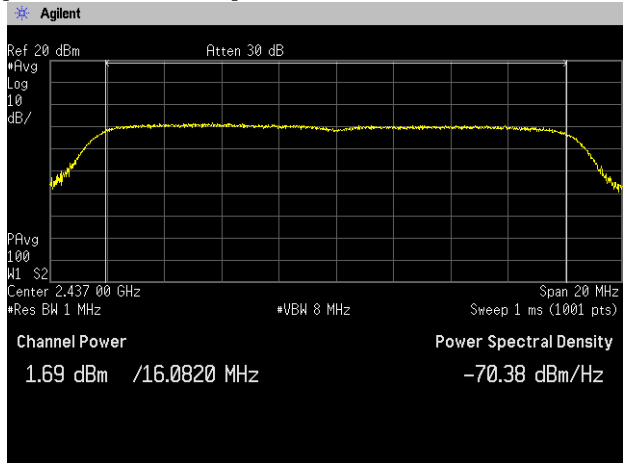
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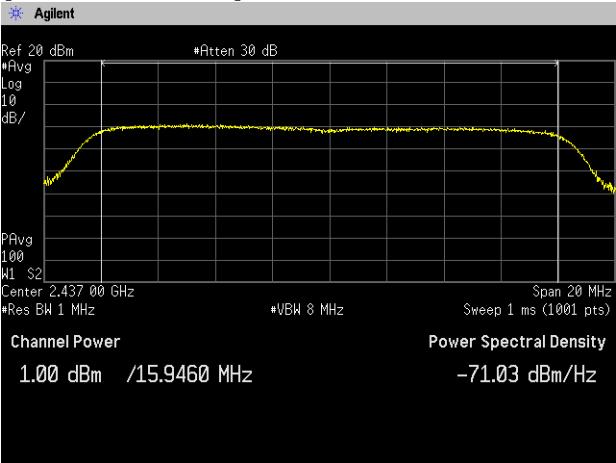
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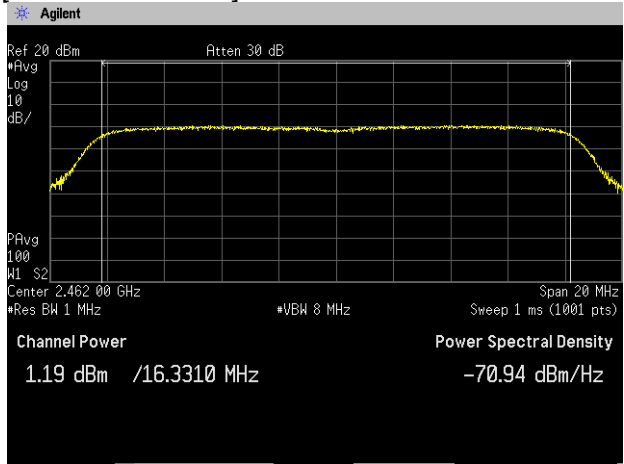
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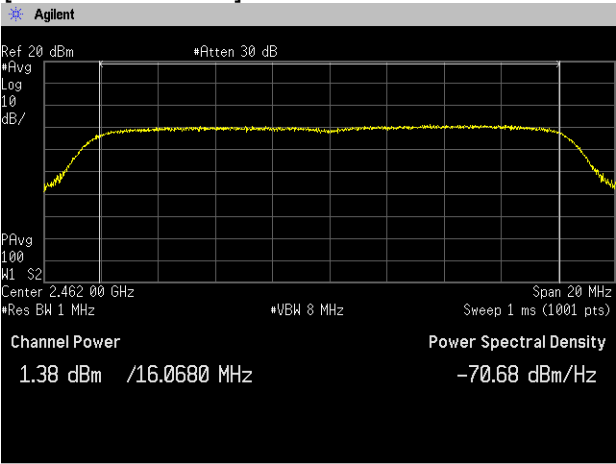
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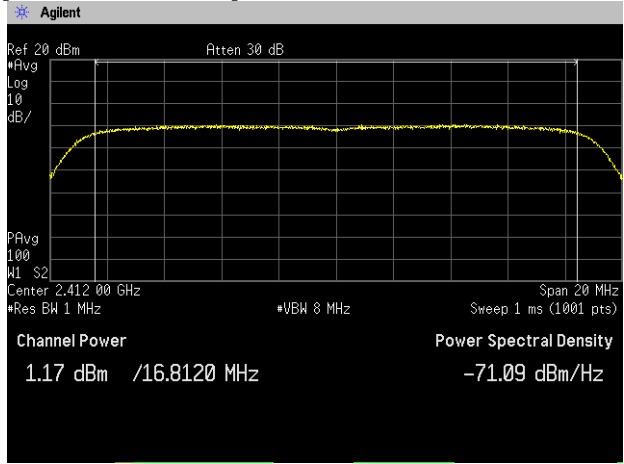


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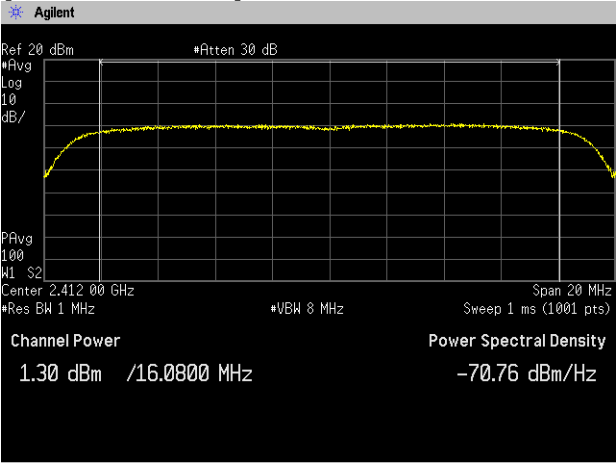


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[IEEE 802.11n (HT20)]

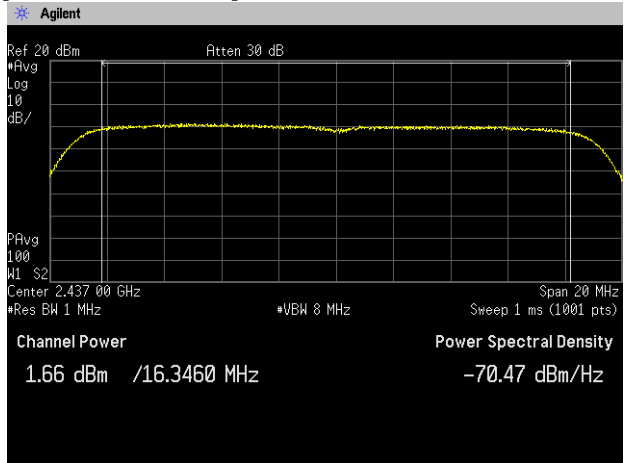
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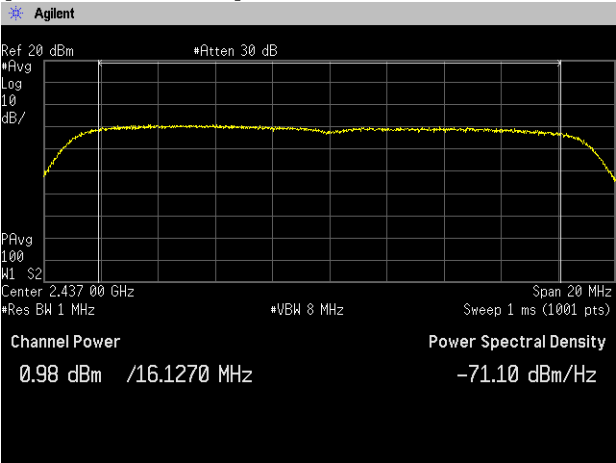
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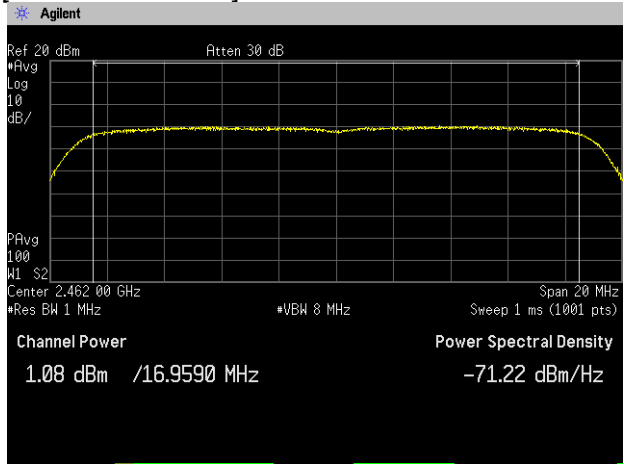
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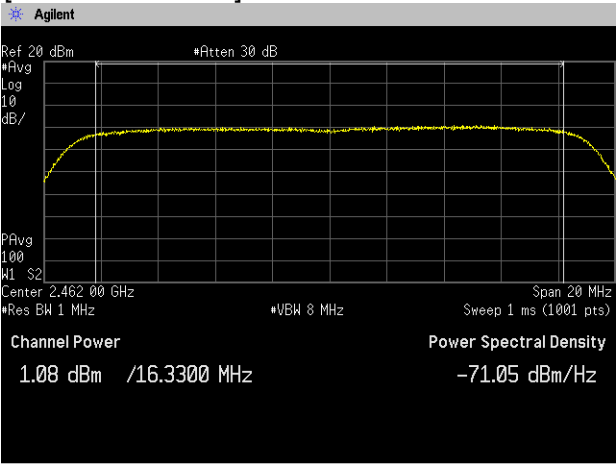
[FCC ID: JOYDA28]



Channel High
[FCC ID: JOYKA73]



[FCC ID: JOYDA28]



BT_EDR Conducted Powers

Measurement result

[FCC ID: JOYKA73]

Packet type	Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
DH5	Low	2402	-0.43	10.51	10.08	10.186	≤ 125	PASS
	Middle	2441	-1.04	10.51	9.47	8.851	≤ 125	PASS
	High	2480	-1.59	10.51	8.92	7.798	≤ 125	PASS
3-DH5	Low	2402	0.81	10.51	11.32	13.552	≤ 125	PASS
	Middle	2441	0.22	10.51	10.73	11.830	≤ 125	PASS
	High	2480	-0.37	10.51	10.14	10.328	≤ 125	PASS

[FCC ID: JOYDA28]

Packet type	Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
DH5	Low	2402	-0.91	10.73	9.82	9.594	≤ 125	PASS
	Middle	2441	-1.61	10.73	9.12	8.166	≤ 125	PASS
	High	2480	-1.97	10.73	8.76	7.516	≤ 125	PASS
3-DH5	Low	2402	0.35	10.73	11.08	12.823	≤ 125	PASS
	Middle	2441	-0.32	10.73	10.41	10.990	≤ 125	PASS
	High	2480	-0.64	10.73	10.09	10.209	≤ 125	PASS

Comparison of measurement results

Mode	Frequency [MHz]	BT_EDR Conducted Power [dBm]		
		FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
DH5	2402	10.08	9.82	0.26
	2441	9.47	9.12	0.35
	2480	8.92	8.76	0.16
3-DH5	2402	11.32	11.08	0.24
	2441	10.73	10.41	0.32
	2480	10.14	10.09	0.05

BT_EDR Peak RF Power

BT_LE Conducted Powers

Measurement result

[FCC ID: JOYKA73]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2402	-8.51	10.51	2.00	1.585	≤ 1000	PASS
Middle	2440	-8.91	10.51	1.60	1.445	≤ 1000	PASS
High	2480	-9.34	10.51	1.17	1.309	≤ 1000	PASS

[FCC ID: JOYDA28]

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2402	-9.22	10.73	1.51	1.416	≤ 1000	PASS
Middle	2440	-9.62	10.73	1.11	1.291	≤ 1000	PASS
High	2480	-9.99	10.73	0.74	1.186	≤ 1000	PASS

Comparison of measurement results

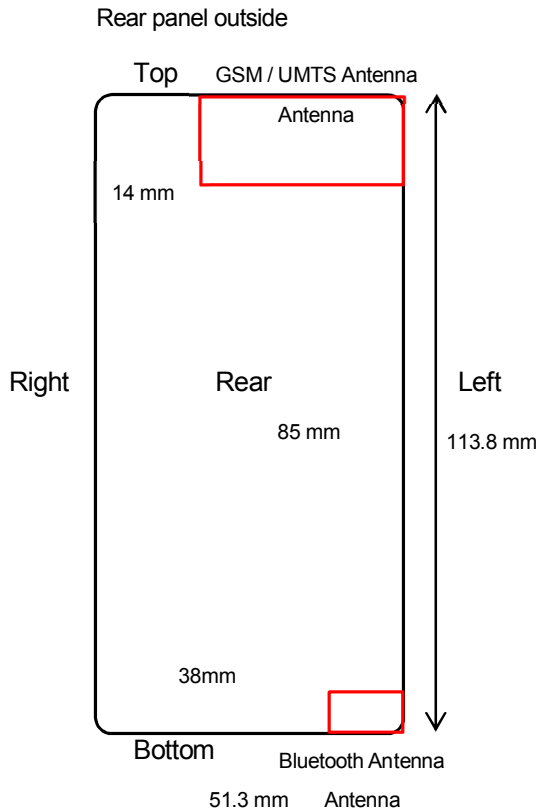
Mode	Frequency [MHz]	BT_LE Conducted Power [dBm]		
		FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
BT LE	2402	2.00	1.51	0.49
	2440	1.60	1.11	0.49
	2480	1.17	0.74	0.43

BT_LE Peak RF Power

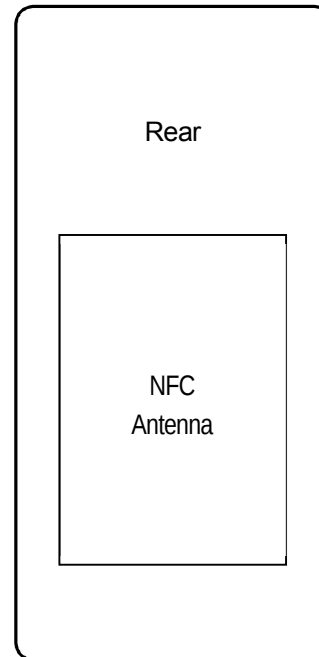
3.2 SAR Test Result

According to the manufacturer attestation letter, FCC ID : JOYKA73 and FCC ID: JOYDA28 unlicensed radios(WLAN/BT) and licensed radios(GSM/UMTS) are electronically identical. They share the same chipset, same power and same antenna performance including antenna gain and location and distance.

DUT Antenna Locations(Rear side view)



NFC Antenna Locations(Rear side view)



Mode	Reported SAR 1g SAR [W/kg]		
	FCC ID: JOYKA73	FCC ID: JOYDA28	Difference
GSM850_Head	0.353	0.457	0.104
GSM850_Body-Worm	0.798	0.891	0.172
GPRS850_Head	0.335	0.560	0.225
GPRS850_Body-Worm	0.683	1.115	0.432
GPRS850_Hotspot	0.753	1.241	0.488
PCS1900_Head	0.783	0.777	-0.006
2.4GHzWLAN_Head	0.0255	0.019	-0.0065
2.4GHzWLAN_Body-Worm	0.177	0.120	-0.057
Simultaneous SAR per KDB 690783 D01v01r03_Head	0.794	0.788 *1	-0.006
Simultaneous SAR per KDB 690783 D01v01r03_Body-Worm	0.915	1.232 *1	0.317
Simultaneous SAR per KDB 690783 D01v01r03_Hotspot	0.870	1.358 *1	0.488

*1 WLAN SAR result base on original SAR report (FCC ID: JOYKA73).

3.3 Occupied Bandwidth

Measurement procedure

[IC RSS-Gen 4.6.1]

WLAN (6dB Bandwidth)

[FCC ID: JOYKA73]

Channel	Frequency [MHz]	6dB bandwidth [MHz]		
		802.11b	802.11g	802.11n (HT20)
Low	2412	7.156	16.279	16.812
Middle	2437	7.152	16.082	16.346
High	2462	7.169	16.331	16.959

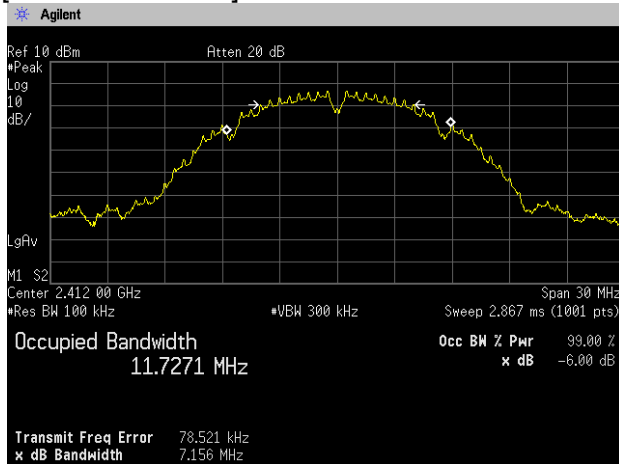
[FCC ID: JOYDA28]

Channel	Frequency [MHz]	6dB bandwidth [MHz]		
		802.11b	802.11g	802.11n (HT20)
Low	2412	7.154	15.866	16.080
Middle	2437	7.595	15.946	16.127
High	2462	7.145	16.068	16.330

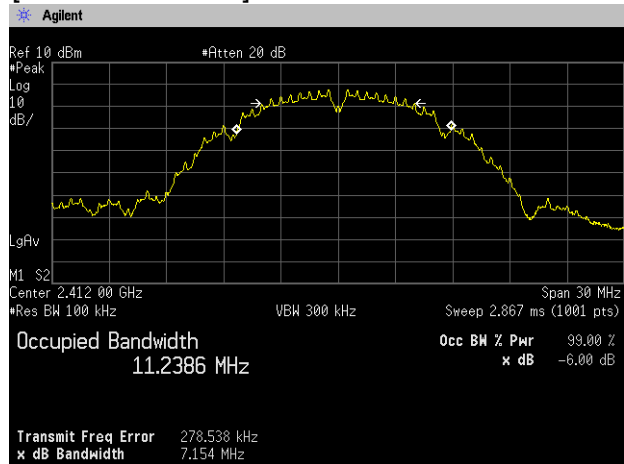
Trace data [IEEE 802.11b]

Channel Low

[FCC ID: JOYKA73]

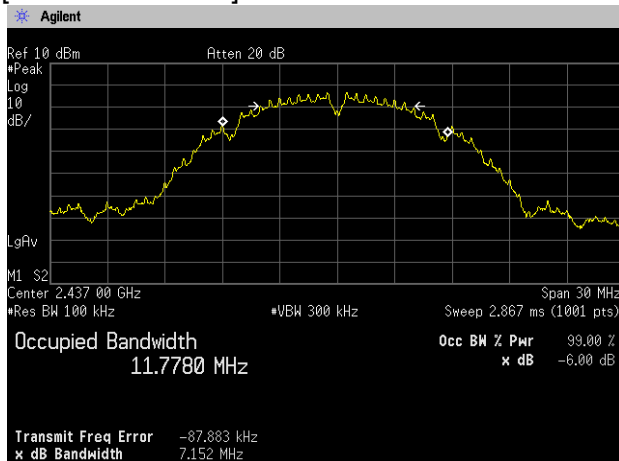


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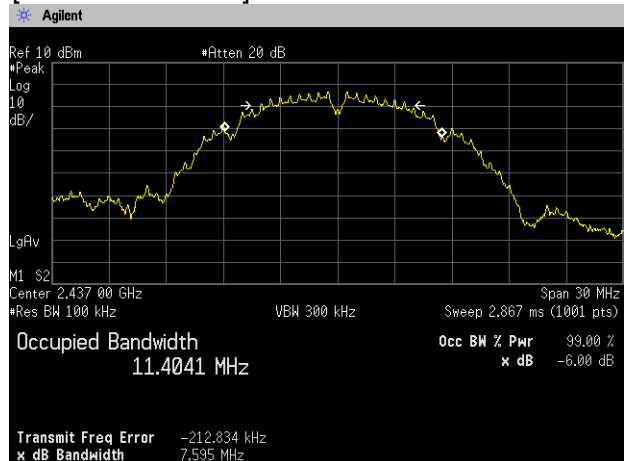


Channel Middle

[FCC ID: JOYKA73]

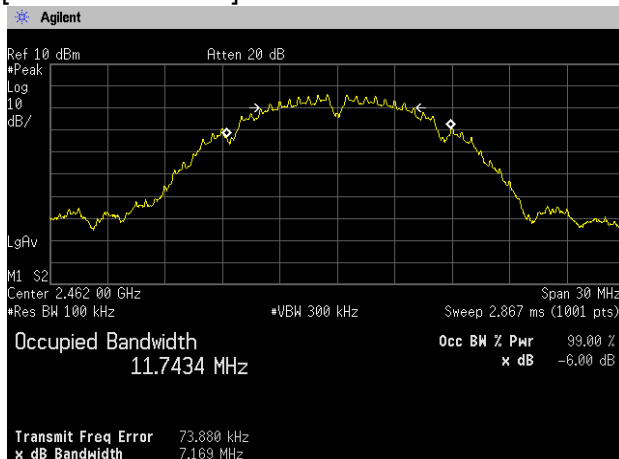


[FCC ID: JOYDA28]

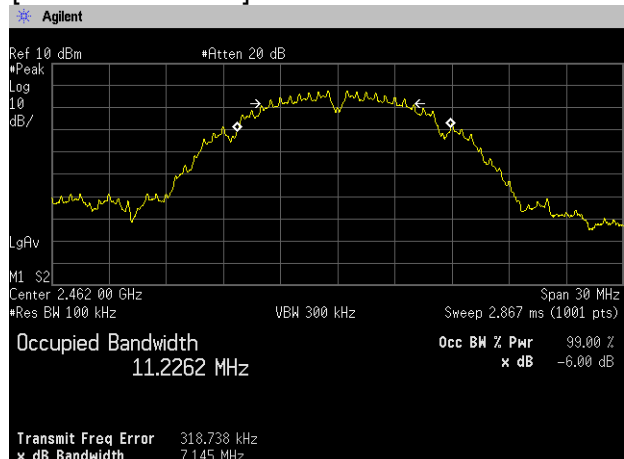


Channel High

[FCC ID: JOYKA73]

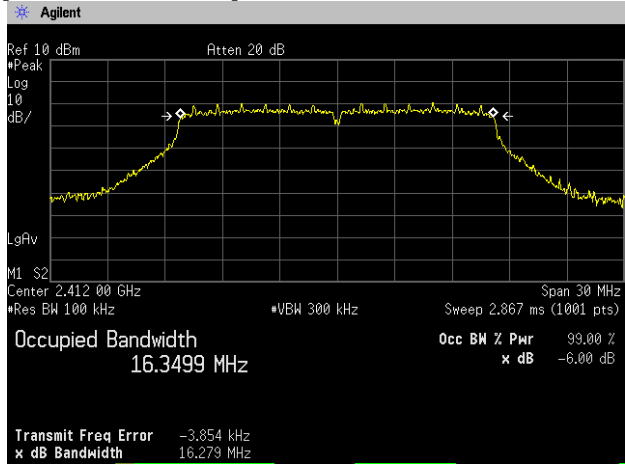


[FCC ID: JOYDA28]

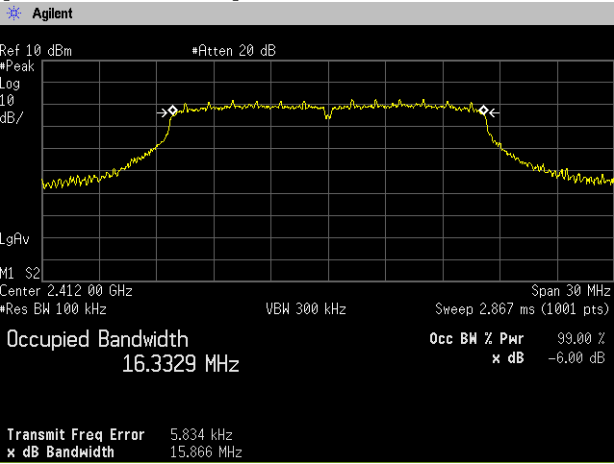


Trace data
[IEEE 802.11g]

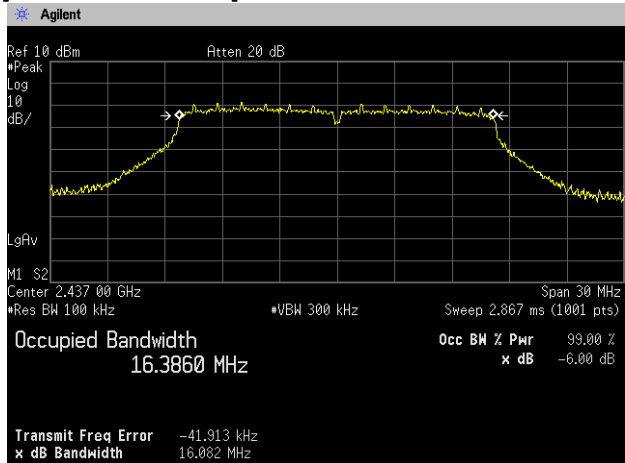
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[FCC ID: JOYKA73]



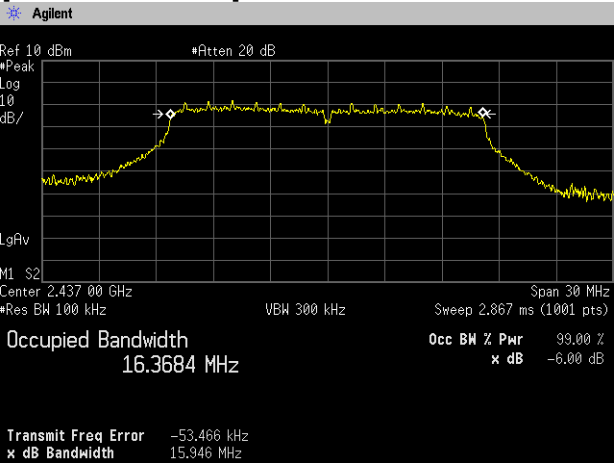
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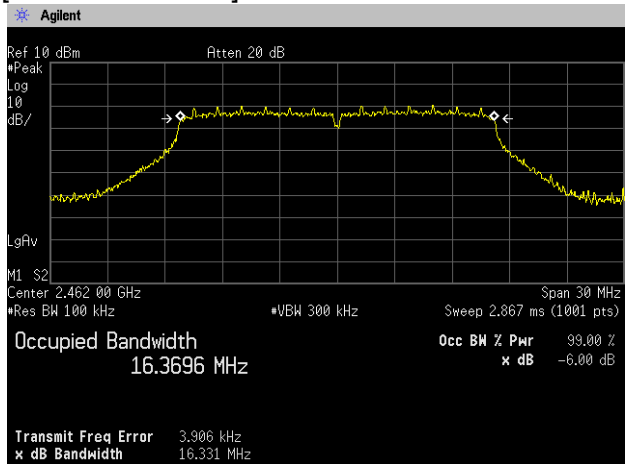
Channel Middle
[FCC ID: JOYKA73]



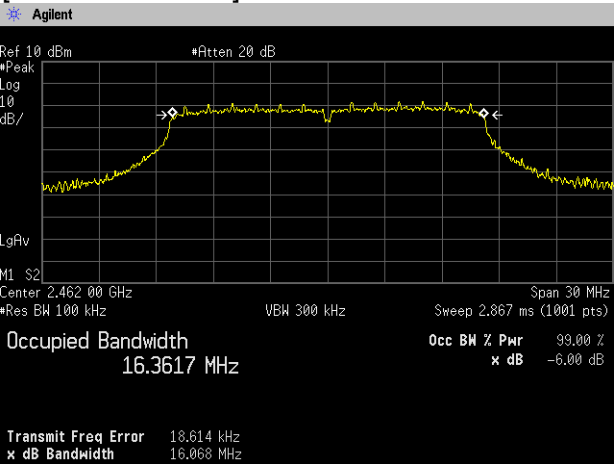
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Channel High
[FCC ID: JOYKA73]



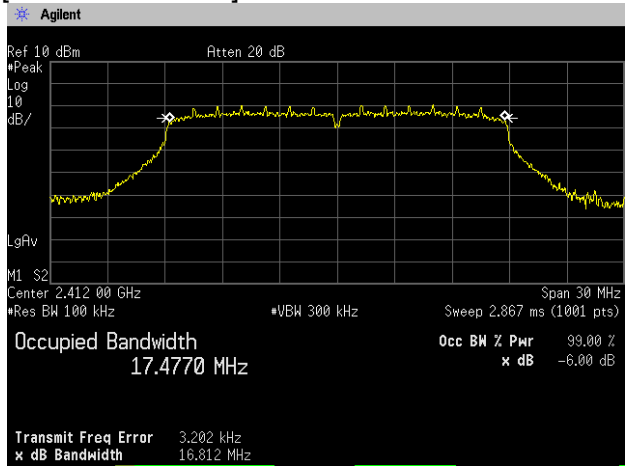
[FCC ID: JOYDA28]



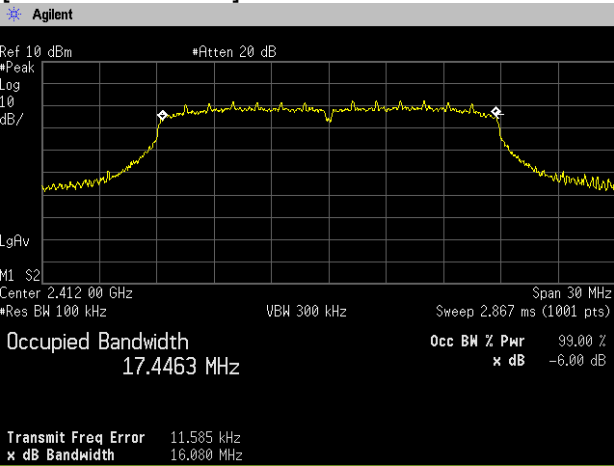
Trace data
[IEEE 802.11n (HT20)]

Channel Low

[FCC ID: JOYKA73]

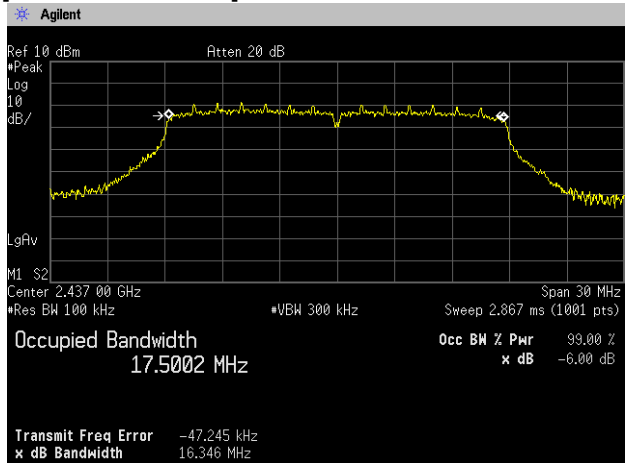


[FCC ID: JOYDA28]

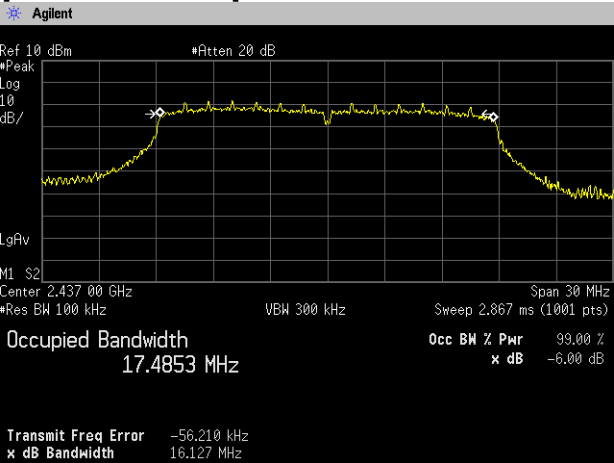


Channel Middle

[FCC ID: JOYKA73]

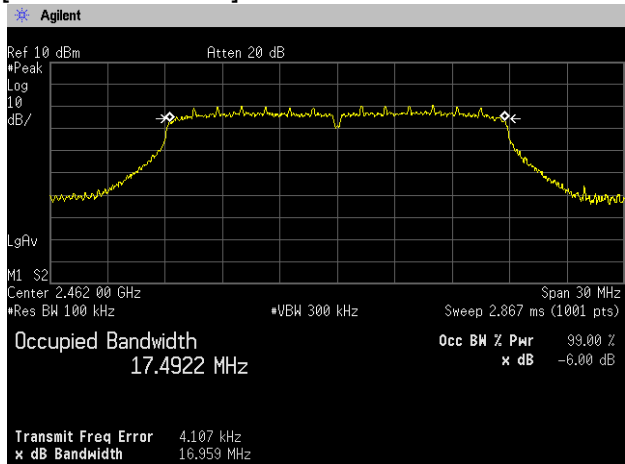


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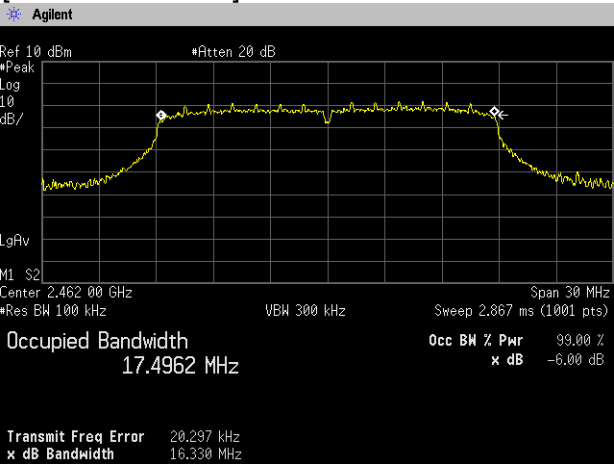


Channel High

[FCC ID: JOYKA73]



[FCC ID: JOYDA28]





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4. Reference detail Section

Equipment Class	Reference FCC ID	Type Grant/ Permissive Change	Date	Reference Application	Folder Test/ RF Exposure	Report Title
DTS	JOYKA73	Original Grant	12/29/2015	JOYDA28	Part 15C (Z101C-15142, Z101C-15143)	All sections applicable
DSS	JOYKA73	Original Grant	12/29/2015	JOYDA28	Part 15C (Z101C-15141)	All sections applicable
PCE	JOYKA73	Original Grant	1/12/2016	JOYDA28	Part 22H (Z101C-15147)	All sections applicable
PCE	JOYKA73	Original Grant	1/8/2016	JOYDA28	Part 24E (Z101C-15148)	All sections applicable



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Appendix A. Test equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. due	Cal. date
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	Jul. 31, 2017	Jul. 15, 2016
Power meter	ROHDE&SCHWARZ	NRP2	103269	Jun. 30, 2017	Jun. 27, 2016
Power sensor	ROHDE&SCHWARZ	NRP-Z81	102459	Jun. 30, 2017	Jun. 27, 2016
Microwave cable	RS	YH-13S5	N/A(S403)	May 31, 2017	May 24, 2016
Attenuator	Weinschel	56-10	J4993	Nov. 30, 2017	Nov. 1, 2016