

NOVISOLUTIONS CIA LTDA

Tune-up (dBm) procedure

This is to formally certify that:

The tune up procedures of Dashcam (FCC ID: 2BO97ENV17PROMAX)

The tune up procedures of is not open to end user. The end user is not allowed to perform final tune. All the power and frequency set up were finished at the manufacturer stage.

Tune up procedure shall be over the power range or at specific operating power levels.

Procedure:

1. Set the Smartphone to operational voltage and on one certain channel in a special service mode by means of company proprietary software.
2. The actual power is measured at several power levels.
3. The gain factors of each individual Tablet are adjusted via the Board-test SW using automatic adjustment arithmetic until the Tune-up Range (dBm) value is met.

It must provide an operational voltage (DC 3.87V by battery) to turn on the device and on one certain channel in service mode by means of company proprietary software.

spectrum analyzer(R&S, FSV40) and Power meter

(DARE, RPR3006W)measures the 2.4G device specific RF characteristics.

Base station simulator (R&S CMW500) measures the 2G/3G/4G device specific RF characteristics. The maximum power of each individual channels are adjusted until the target value met.

1.1. GSM Conducted Power

Band GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	128	189	251	Tune-up	128	189	251
Frequency (MHz)		824.2	836.4	848.8		824.2	836.4	848.8
GSM (GMSK)	33.50	33.19	33.04	32.88	24.47	24.16	24.01	23.85
GPRS(GMSK,1 Tx slot)	33.50	32.26	33.11	32.93	24.47	23.23	24.08	23.90
GPRS(GMSK,2 Tx slot)	30.50	30.38	30.18	29.83	24.48	24.36	24.16	23.81
GPRS(GMSK,3 Tx slot)	28.50	28.46	28.18	27.84	24.24	24.20	23.92	23.58
GPRS(GMSK,4 Tx slot)	26.50	26.20	26.10	25.62	23.49	23.19	23.09	22.61
EGPRS(8PSK,1 Tx slot)	25.50	25.24	25.00	25.39	16.47	16.21	15.97	16.36
EGPRS(8PSK,2 Tx slot)	24.50	24.21	24.09	24.17	18.48	18.19	18.07	18.15
EGPRS(8PSK,3 Tx slot)	22.50	21.91	22.39	21.86	18.24	17.65	18.13	17.60
EGPRS(8PSK,4 Tx slot)	19.50	18.94	19.14	19.01	16.49	15.93	16.13	16.00
Band GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	512	661	810	Tune-up	512	661	810
Frequency (MHz)		1850.2	1880	1909.8		1850.2	1880	1909.8
GSM (GMSK)	30.50	30.08	30.11	29.97	21.47	21.05	21.08	20.94
GPRS(GMSK,1 Tx slot)	30.50	30.05	30.06	29.93	21.47	21.02	21.03	20.90
GPRS(GMSK,2 Tx slot)	27.50	27.02	26.60	26.11	21.48	21.00	20.58	20.09
GPRS(GMSK,3 Tx slot)	25.50	25.40	24.89	24.45	21.24	21.14	20.63	20.19
GPRS(GMSK,4 Tx slot)	23.50	23.30	22.79	22.37	20.49	20.29	19.78	19.36
EGPRS(8PSK,1 Tx slot)	26.00	25.83	25.74	25.77	16.97	16.80	16.71	16.74
EGPRS(8PSK,2 Tx slot)	24.50	24.08	23.71	23.80	18.48	18.06	17.69	17.78

EGPRS(8PSK,3 Tx slot)	22.00	21.79	21.94	21.40	17.74	17.53	17.68	17.14
EGPRS(8PSK,4 Tx slot)	20.50	19.52	20.11	19.69	17.49	16.51	17.10	16.68

1.2. WCDMA Conducted Power

WCDMA Band 2		Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	9262	9400	9538	
Frequency (MHz)		1852.4	1880	1907.6	
RMC12.2K	23.00	22.65	22.71	22.82	
HSDPA Sub 1	23.00	22.71	22.46	22.38	
HSDPA Sub 2	22.50	22.28	22.10	22.04	
HSDPA Sub 3	22.00	21.89	21.86	21.70	
HSDPA Sub 4	22.50	22.14	21.96	21.53	
HSUPA Sub 1	22.50	22.38	22.18	22.11	
HSUPA Sub 2	22.50	22.48	22.40	22.33	
HSUPA Sub 3	22.00	22.00	21.98	21.90	
HSUPA Sub 4	23.00	22.53	22.39	22.35	
HSUPA Sub 5	22.50	22.27	22.09	22.11	
WCDMA Band 5		Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	4132	4182	4233	
Frequency (MHz)		826.4	836.4	846.6	
RMC12.2K	22.50	22.48	22.37	22.47	
HSDPA Sub 1	22.50	22.33	22.20	22.40	
HSDPA Sub 2	22.50	22.09	21.91	22.18	
HSDPA Sub 3	22.00	21.73	21.86	21.88	
HSDPA Sub 4	22.00	21.58	21.69	21.62	
HSUPA Sub 1	22.50	22.31	22.00	22.20	
HSUPA Sub 2	22.50	22.25	22.20	22.36	
HSUPA Sub 3	22.50	21.93	21.72	22.21	
HSUPA Sub 4	22.50	22.26	22.21	22.37	
HSUPA Sub 5	22.50	22.17	22.05	22.14	

1.3. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18607/1850.7	18900/1880	19193/1909.3
LTE Band 2	1.4MHz	QPSK	1	0	25.00	24.33	24.65	24.94
			1	2	25.00	24.26	24.56	24.95
			1	5	25.00	24.32	24.62	24.85
			3	0	25.00	24.46	24.40	24.61
			3	1	25.00	24.52	24.48	24.72
			3	2	25.00	24.47	24.44	24.68
			6	0	24.00	23.41	23.36	23.60
		16QAM	1	0	24.00	23.88	22.94	23.67
			1	2	24.00	23.92	22.78	23.60
			1	5	24.00	23.97	22.83	23.74
			3	0	24.00	23.66	23.26	23.83
			3	1	24.00	23.60	23.23	23.87
			3	2	24.00	23.72	23.24	23.80
			6	0	23.00	22.22	22.27	22.54
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band 2	3MHz	QPSK	1	0	25.00	24.44	24.47	24.63
			1	7	25.00	24.42	24.55	24.70
			1	14	25.00	24.57	24.50	24.60
			8	0	24.00	23.45	23.44	23.67
			8	4	24.00	23.35	23.41	23.60
			8	7	24.00	23.49	23.38	23.67
			15	0	24.00	23.43	23.38	23.68
		16QAM	1	0	24.50	23.94	23.34	24.12
			1	7	24.50	23.83	23.31	24.02
			1	14	24.50	23.90	23.31	24.13
			8	0	23.00	22.57	22.37	22.85
			8	4	23.00	22.58	22.44	22.83
			8	7	23.00	22.55	22.50	22.87
			15	0	23.00	22.51	22.35	22.71
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
LTE Band 2	5MHz	QPSK	1	0	25.00	24.66	24.62	24.92
			1	12	25.00	24.69	24.65	24.99
			1	24	25.00	24.69	24.66	24.90
			12	0	24.00	23.48	23.23	23.58
			12	6	24.00	23.44	23.39	23.60
			12	11	24.00	23.43	23.46	23.65
			25	0	24.00	23.42	23.34	23.51
		16QAM	1	0	24.00	23.45	23.25	23.75
			1	12	24.00	23.53	23.33	23.68
			1	24	24.00	23.38	23.31	23.73
			12	0	23.00	22.43	22.36	22.70
			12	6	23.00	22.48	22.55	22.64

			12	11	23.00	22.42	22.54	22.83
			25	0	23.00	22.68	22.58	22.88
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18650/1855	18900/1880	19150/1905
LTE Band 2	10MHz	QPSK	1	0	25.00	24.71	24.30	24.63
			1	24	25.00	24.75	24.40	24.75
			1	49	25.00	24.67	24.51	24.71
			25	0	24.00	23.49	23.19	23.68
			25	12	24.00	23.34	23.30	23.57
			25	24	24.00	23.40	23.32	23.61
			50	0	24.00	23.53	23.32	23.60
		16QAM	1	0	24.50	23.32	23.81	24.13
			1	24	24.50	23.39	23.89	24.14
			1	49	24.50	23.44	23.85	24.14
			25	0	23.00	22.67	22.27	22.60
			25	12	23.00	22.61	22.38	22.61
			25	24	23.00	22.58	22.36	22.66
			50	0	23.00	22.46	22.38	22.65
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5
LTE Band 2	15MHz	QPSK	1	0	25.00	24.51	24.29	24.65
			1	37	25.00	24.41	24.38	24.68
			1	74	25.00	24.32	24.50	24.71
			36	0	24.00	23.44	23.21	23.61
			36	18	24.00	23.36	23.32	23.61
			36	37	24.00	23.38	23.41	23.70
			75	0	24.00	23.46	23.37	23.66
		16QAM	1	0	24.50	23.94	23.76	24.12
			1	37	24.50	23.94	23.94	24.16
			1	74	24.50	23.86	24.02	24.25
			36	0	23.00	22.39	22.25	22.69
			36	18	23.00	22.43	22.39	22.64
			36	37	23.00	22.42	22.35	22.66
			75	0	23.00	22.47	22.45	22.71
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
LTE Band 2	20MHz	QPSK	1	0	25.00	24.65	24.49	24.96
			1	49	25.00	24.71	24.55	24.94
			1	99	25.00	24.57	24.90	24.88
			50	0	24.00	23.42	23.36	23.62
			50	24	24.00	23.40	23.48	23.60
			50	49	24.00	23.24	23.43	23.67
			100	0	24.00	23.45	23.39	23.68
		16QAM	1	0	24.00	23.45	22.78	23.59
			1	49	24.00	23.44	22.86	23.76
			1	99	24.00	23.20	23.18	23.68
			50	0	23.00	22.42	22.32	22.69

			50	24	23.00	22.29	22.38	22.68
			50	49	23.00	22.32	22.41	22.73
			100	0	23.00	22.35	22.41	22.74

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band 4	1.4MHz	QPSK	1	0	24.50	23.73	23.87	24.00
			1	2	24.50	23.72	23.85	24.02
			1	5	24.50	23.67	23.85	23.93
			3	0	24.00	23.96	23.92	23.98
			3	1	24.00	23.93	23.89	23.91
			3	2	24.00	23.86	23.93	23.85
		16QAM	6	0	23.00	22.86	22.82	22.77
			1	0	23.50	23.38	23.31	23.12
			1	2	23.50	23.38	23.23	23.15
			1	5	23.50	23.34	23.35	23.01
			3	0	23.50	23.15	23.04	23.29
			3	1	23.50	23.23	23.11	23.20
			3	2	23.50	23.12	23.06	23.17
			6	0	22.00	21.58	21.46	21.76
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band 4	3MHz	QPSK	1	0	24.00	23.95	23.84	23.92
			1	7	24.00	23.91	23.88	24.00
			1	14	24.00	23.81	23.86	23.96
			8	0	23.50	22.88	22.80	22.98
			8	4	23.50	22.98	22.83	23.06
			8	7	23.50	22.79	22.81	22.93
			15	0	23.00	22.90	22.77	22.93
		16QAM	1	0	23.50	23.32	23.29	23.44
			1	7	23.50	23.46	23.32	23.41
			1	14	23.50	23.30	23.28	23.43
			8	0	22.50	22.04	21.94	22.09
			8	4	22.50	22.00	21.91	22.04
			8	7	22.50	21.84	21.88	22.17
			15	0	22.50	21.94	21.89	22.09
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
LTE Band 4	5MHz	QPSK	1	0	24.50	23.91	24.07	24.21
			1	12	24.50	23.85	24.14	24.17
			1	24	24.50	23.86	24.12	24.18
			12	0	23.50	22.85	22.75	23.07
			12	6	23.50	22.74	22.72	22.93
			12	11	23.50	22.71	22.76	22.95
			25	0	23.00	22.77	22.85	22.90
		16QAM	1	0	23.50	23.43	22.81	22.97
			1	12	23.50	23.23	22.90	22.88
			1	24	23.50	23.27	22.86	22.97

			12	0	22.50	21.91	21.86	22.10
			12	6	22.50	21.81	21.87	22.02
			12	11	22.50	21.83	21.80	22.04
			25	0	22.50	21.76	22.07	22.17
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
LTE Band 4	10MHz	QPSK	1	0	24.50	24.13	23.77	23.84
			1	24	24.50	24.05	23.89	23.90
			1	49	24.50	24.06	23.88	23.96
			25	0	23.50	22.82	22.84	22.92
			25	12	23.50	22.88	22.75	22.89
			25	24	23.50	22.79	22.78	23.04
			50	0	23.00	22.91	22.89	22.91
		16QAM	1	0	24.00	22.89	23.31	23.51
			1	24	24.00	22.82	23.25	23.71
			1	49	24.00	22.89	23.34	23.59
			25	0	22.50	22.02	21.83	21.93
			25	12	22.50	22.10	21.76	21.98
			25	24	22.50	22.07	21.88	22.00
			50	0	22.50	21.87	21.80	22.07
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band 4	15MHz	QPSK	1	0	24.00	23.89	23.88	23.82
			1	37	24.00	23.81	23.88	23.88
			1	74	24.00	23.79	23.95	23.99
			36	0	23.00	22.83	22.70	22.89
			36	18	23.00	22.74	22.79	22.99
			36	37	23.00	22.83	22.85	22.99
			75	0	23.00	22.77	22.82	22.89
		16QAM	1	0	24.00	23.47	23.34	23.58
			1	37	24.00	23.30	23.30	23.56
			1	74	24.00	23.33	23.42	23.63
			36	0	22.00	21.84	21.79	21.84
			36	18	22.00	21.85	21.79	21.85
			36	37	22.00	21.90	21.84	21.96
			75	0	22.50	21.89	21.95	22.08
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
LTE Band 4	20MHz	QPSK	1	0	24.50	24.13	24.09	23.87
			1	49	24.50	24.11	24.12	23.90
			1	99	24.50	24.16	24.16	24.05
			50	0	23.00	22.76	22.80	22.97
			50	24	23.00	22.79	22.75	22.97
			50	49	23.00	22.78	22.89	22.88
			100	0	23.00	22.89	22.84	22.81
		16QAM	1	0	23.50	22.87	22.71	22.84
			1	49	23.50	22.84	22.86	23.12

			1	99	23.50	22.78	22.92	23.15
			50	0	22.00	21.88	21.76	21.95
			50	24	22.00	21.88	21.78	21.97
			50	49	22.00	21.88	21.85	21.97
			100	0	22.00	21.88	21.86	21.99

1.4. WLAN & Bluetooth Output Power

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11b	1	2412	14.50	14.32
	6	2437	14.50	13.38
	11	2462	14.50	13.25
802.11g	1	2412	12.50	11.66
	6	2437	12.50	11.85
	11	2462	12.50	12.01
802.11n HT20	1	2412	12.00	11.82
	6	2437	12.00	11.89
	11	2462	12.00	11.92
802.11n HT40	3	2422	13.00	12.65
	6	2437	13.00	11.63
	9	2452	13.00	11.47

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	36	5180	12.50	11.02
	40	5200	12.50	12.15
	48	5240	12.50	12.01
802.11n HT20	36	5180	12.50	11.69
	40	5200	12.50	11.89
	48	5240	12.50	12.14
802.11n HT40	38	5190	11.00	10.37
	46	5230	11.00	10.79
802.11ac VHT20	36	5180	11.50	10.30
	40	5200	11.50	11.08
	48	5240	11.50	11.35
802.11ac VHT40	38	5190	11.00	10.22
	46	5230	11.00	10.61
802.11ac VHT80	42	5210	10.50	10.43

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	52	5260	10.50	10.24

	56	5280	10.50	10.14
	64	5320	10.50	10.13
802.11n HT20	52	5260	11.00	10.06
	56	5280	11.00	10.76
	64	5320	11.00	10.32
802.11n HT40	54	5270	10.50	10.00
	62	5310	10.50	10.11
802.11ac VHT20	52	5260	11.00	10.09
	56	5280	11.00	10.67
	64	5320	11.00	10.03
802.11ac VHT40	54	5270	10.50	10.27
	62	5310	10.50	10.00
802.11ac VHT80	58	5290	10.50	10.49

NOTE: Power measurement results of WLAN 5.3G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	12.00	10.18
	157	5785	12.00	11.71
	165	5825	12.00	11.61
802.11n HT20	149	5745	12.00	10.54
	157	5785	12.00	11.51
	165	5825	12.00	11.36
802.11n HT40	151	5755	12.00	11.17
	159	5795	12.00	11.58
802.11ac VHT20	149	5745	11.50	10.23
	157	5785	11.50	11.48
	165	5825	11.50	11.43
802.11ac VHT40	151	5755	12.00	11.43
	159	5795	12.00	11.91
802.11ac VHT80	155	5775	11.50	11.19

NOTE: Power measurement results of WLAN 5.8G.

BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	0	-1.58	-0.25	-0.59
	2M	-0.50	-1.70	-0.50	-0.74

NOTE: Power measurement results of Bluetooth.

Maria Cruz

MARIA CRUZ / PURCHASE MANAGER

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