

LETTER OF REQUEST

PERMISSIVE CHANGE

20 May 2020

We, as a manufacturer of following equipment, hereby submit Class 2 Permissive Change application for the FCC and Class 3 Permissive Change for the ISED to have additional antennas in the filings.

MODEL	FCC		ISED	
GEN11NAN	FCC ID	BEJGEN11NAN	Certification Number	2703H-GEN11NAN
	Original Grant Date	14 September 2017	Original Grant Date	18 September 2017
	Equipment Type	Single Modular	HVIN	GEN11NAN
			PMN	GEN11NAN
			CURRENT FVIN	N/A
			C3PC FVIN	6.65
TTA20ANEBR	FCC ID	BEJ-TTA20ANEBR	-	
	Original Grant Date	16 May 2018		
	Equipment Type	Telematics		

A. ANTENNA INFORMATION

We have 11 antennas and gain was measured in each band. The worst-case scenarios have been chosen based on these values. We also confirm the measured gains are the highest gain in all directions and all frequencies.

ID	PART NUMBER MODEL NAME	Cable Type	Antenna Gain, Cable Loss				Final Gain including Cable Loss			
			715 MHz	829 MHz	1732 MHz	1880 MHz	715 MHz	829 MHz	1732 MHz	1880 MHz
1	84744318 Sharkfin NA	A	3.72 dBi	2.31 dBi	4.64 dBi	3.70 dBi	2.90 dBi	1.43 dBi	3.35 dBi	2.34 dBi
2	42747534-39047412 Hexband 3	A	-1.42 dBi	3.32 dBi	4.90 dBi	4.83 dBi	-2.24 dBi	2.44 dBi	3.61 dBi	3.47 dBi
3	84728097 Sharkfin ChopTop	A	-4.03 dBi	4.69 dBi	5.52 dBi	4.74 dBi	-4.85 dBi	3.81 dBi	4.23 dBi	3.38 dBi
4	84719518-84664058 Hexband 2	A	-5.53 dBi	-6.56 dBi	2.04 dBi	0.01 dBi	-6.35 dBi	-7.44 dBi	0.75 dBi	-1.35 dBi
5	84886535-22969192 Hexband 1	A	2.13 dBi	0.49 dBi	6.10 dBi	3.69 dBi	1.31 dBi	-0.39 dBi	4.81 dBi	2.33 dBi
6	42756075-84664058 Hexband 4	A	-5.80 dBi	-5.57 dBi	3.24 dBi	0.19 dBi	-6.62 dBi	-6.45 dBi	1.95 dBi	-1.17 dBi
7	84881230 MiniMega NA	A	3.74 dBi	-4.48 dBi	7.48 dBi	6.69 dBi	2.92 dBi	-5.36 dBi	6.19 dBi	5.33 dBi
8	84876043 T1xx	A	3.42 dBi	3.78 dBi	2.86 dBi	3.22 dBi	2.60 dBi	2.90 dBi	1.57 dBi	1.86 dBi
9	84744329 Sharkfin RoW	A	-4.52 dBi	-0.21 dBi	3.07 dBi	3.29 dBi	-5.34 dBi	-1.09 dBi	1.78 dBi	1.93 dBi
10	84884131 MiniMega RoW	A	-6.95 dBi	2.44 dBi	6.15 dBi	5.03 dBi	-7.77 dBi	1.56 dBi	4.86 dBi	3.67 dBi
11	84671653 Y2xx	B	4.88 dBi	4.31 dBi	5.16 dBi	2.62 dBi	4.26 dBi	3.66 dBi	4.03 dBi	1.33 dBi
-	CABLE LOSS - TYPE A	A	-0.82 dB	-0.88 dB	-1.29 dB	-1.36 dB				
-	CABLE LOSS - TYPE B	B	-0.62 dB	-0.65 dB	-1.13 dB	-1.29 dB				

- Antenna ID 1 to 10 share same cable type A, Only ID 11 has specific cable, type B.

B. WORST CASE SELECTION

Frequency Range	Worst Case Antenna	Peak Gain in range
0 kHz - 1GHz	84671653 Y2xx	4.26 dBi
1GHz - 30GHz	84881230 MiniMega NA	6.19 dBi

84671653 Y2xx in 715MHz and 829 MHz. 84728097 Sharkfin ChopTop has slightly higher gain than the Y2xx in 829 MHz but overall gain is lower than Y2xx. Actual testing was performed with the Y2xx antenna but for ERP and MPE calculations, antenna gain 3.81 dBi shall be used as worst case. 84881230 MiniMega NA is the worst case for all frequencies above 1GHz.

According to the KDB 178919 and KDB 996369, host manufacturer can use antenna including cable loss has gain less than following table.

GSM 850, WCDMA 5, LTE 5	3.81 dBi
WCDMA 4, LTE 4	6.19 dBi
GSM 1900, WCDMA 2, LTE 2	5.33 dBi
LTE 12, LTE 13	4.26 dBi

C. POWER REDUCTION

To comply the ERP/EIRP limits and meet ERP thresholds for exemption from routine evaluation for MPE, power reduction mechanism is implemented on the module. Depending on the antenna selected for a specific vehicle installation the vehicle manufacturer can select a power of 1 dB in GSM 850, 3.5 dB in GSM 1900 as shown in the tables below. The end user cannot access the controls to reset the output power to the nominal settings to override the power reduction. EUT will be installed under the hood and users cannot reach the EUT itself. All the antennas shall be installed 20cm from any passengers or people around vehicle. Following table shows ERP/EIRP Calculation based on maximum production power.

Band	Frequency	Target Power	Max Tune-up Tolerance	Final Gain Incl. Cable Loss	Power Reduction	Final ERP	ERP Limit	Margin
LTE 12	701.5 MHz	23 dBm	1 dB	4.26 dBi		26.11 dBm	34.77 dBm	8.66 dB
LTE 13	779.5 MHz	23 dBm	1 dB	4.26 dBi		26.11 dBm	34.77 dBm	8.66 dB
GSM 850	824.2 MHz	33 dBm	1 dB	3.81 dBi	1 dB <small>Note 1</small>	34.66 dBm	38.45 dBm	3.79 dB
WCDMA 5	826.4 MHz	23 dBm	1 dB	3.81 dBi		25.66 dBm	38.45 dBm	12.79 dB
LTE 5	826.5 MHz	23 dBm	1 dB	3.81 dBi		25.66 dBm	38.45 dBm	12.79 dB

Note 1: Power reduction required for GSM 850 whenever the antenna gain exceed 2.81dBi for the 850 band.

Band	Frequency	Target Power	Max Tune-up Tolerance	Final Gain Incl. Cable Loss	Power Reduction	Final EIRP	EIRP Limit	Margin
WCDMA 4	1712.4 MHz	22.7 dBm	1 dB	6.19 dBi		29.89 dBm	30.00 dBm	0.11 dB
LTE 4	1720 MHz	22.7 dBm	1 dB	6.19 dBi		29.89 dBm	30.00 dBm	0.11 dB
GSM 1900	1850.2 MHz	30 dBm	1 dB	5.33 dBi	3.5 dB	32.83 dBm	33.00 dBm	0.17 dB
WCDMA 2	1852.4 MHz	23 dBm	1 dB	5.33 dBi		29.33 dBm	33.00 dBm	3.67 dB
LTE 2	1860 MHz	23 dBm	1 dB	5.33 dBi		29.33 dBm	33.00 dBm	3.67 dB
GSM 900	880-915 MHz	33 dBm	1 dB	3.61 dBi	2.5 dB	32.96 dBm	N/A	N/A

Note 1: Power reduction required for GSM 1900 whenever the antenna gain exceeds 2.0 dBi for the 1900 band.

- Calculated ERP: Target Power + Tune-up Tolerance + Peak Gain - 2.15 dB
- Calculated EIRP: Target Power + Tune-up Tolerance + Peak Gain
- Final ERP/EIRP: ERP/EIRP - Power Reduction
- GSM 900 is not included in FCC/ISED certified scope but power reduction will be applied for Brazilian market.

D. ERP/EIRP MEASUREMENT

ERP/EIRP measurements were performed with the highest gain antenna configuration. GSM 850 was measured with Y2xx antenna which has antenna gain 3.66 dBi. Power reduction factor was applied, all the measured values comply under the ERP/EIRP limit. As GEN11NAN is a modular, test was performed in stand-alone configuration and both models were tested with production sample.

GEN11NAN

Frequency (MHz)	Method (ERP/EIRP)	Ant. Pol. H or V	Reading (dBuV)	AF (dB)	CL (dB)	Conversion Factor (dB)	ERP/EIRP (dBm)	ERP or EIRP (mW)
GSM850								
824.20	ERP	H	99.09	26.93	5.41	-97.41	34.02	2524.89
824.20	ERP	V	94.48	26.93	5.41	-97.41	29.41	873.46
836.60	ERP	H	98.79	27.23	5.46	-97.41	34.07	2554.13
836.60	ERP	V	94.01	27.23	5.46	-97.41	29.29	849.65
848.80	ERP	H	99.80	27.48	5.49	-97.41	35.36	3437.50
848.80	ERP	V	94.20	27.48	5.49	-97.41	29.76	946.77
GSM1900								
1 850.20	EIRP	H	77.05	27.50	7.30	-95.26	16.59	45.63
1 850.20	EIRP	V	91.25	27.50	7.30	-95.26	30.79	1200.17
1 880.00	EIRP	H	80.17	27.74	7.31	-95.26	19.96	99.14
1 880.00	EIRP	V	90.99	27.74	7.31	-95.26	30.78	1197.41
1 909.80	EIRP	H	76.51	27.82	7.37	-95.26	16.44	44.08
1 909.80	EIRP	V	90.42	27.82	7.37	-95.26	30.35	1084.53

TTA20ANEBR

Frequency (MHz)	Method (ERP/EIRP)	Ant. Pol. H or V	Reading (dBuV)	AF (dB)	CL (dB)	Conversion Factor (dB)	ERP/EIRP (dBm)	ERP or EIRP (mW)
GSM850								
824.20	ERP	H	101.98	26.93	5.41	-97.41	36.91	4911.82
824.20	ERP	V	88.92	26.93	5.41	-97.41	23.85	242.80
836.60	ERP	H	101.66	27.23	5.46	-97.41	36.94	4945.87
836.60	ERP	V	91.94	27.23	5.46	-97.41	27.22	527.52
848.80	ERP	H	101.48	27.48	5.49	-97.41	37.04	5061.07
848.80	ERP	V	91.15	27.48	5.49	-97.41	26.71	469.08
GSM1900								
1 850.20	EIRP	H	78.44	27.50	7.30	-95.26	17.98	62.84
1 850.20	EIRP	V	92.74	27.50	7.30	-95.26	32.28	1691.39
1 880.00	EIRP	H	77.69	27.74	7.31	-95.26	17.48	56.01
1 880.00	EIRP	V	93.12	27.74	7.31	-95.26	32.91	1955.43
1 909.80	EIRP	H	75.28	27.82	7.37	-95.26	15.21	33.21
1 909.80	EIRP	V	92.53	27.82	7.37	-95.26	32.46	1762.96

E. CONCLUSION

Both models with the highest gain antenna comply ERP/EIRP requirements, power thresholds for exemption from routine evaluation, MPE limits at 20cm and the limits in Parts 22, 24 and 27 of FCC rules and RSS standards has been based on maximum production power, including the power reduction for GSM modes as noted.

Based on technical analysis mentioned above, we hereby request permissive change for both FCC and ISED certification.



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