

# 1. SPECIFICATION (REFTIA/EIA/IS-137-A-1)

## 1. Confirmation of Power level(Class IV)

Level	Analog(dBm)	Digital(dBm)
0,1,2	26.2	26.0
3	23	23
4	20	20
5	16	16
6	12	12
7	8	8
8	-	3
9		-2
10		-7

## 2. Channel Numbering and Frequency

System	Channel Number	Transmitter	Receiver
(Not used)	990 CH	824.01 MHz	869.01 MHz
A''	991 CH ~ 1023 CH	824.04 ~ 825.00 MHz	869.04 ~ 870.00 MHz
A	1 CH ~ 333 CH	825.03 ~ 834.99 MHz	870.03 ~ 879.99 MHz
B	334 CH ~ 666 CH	835.02 ~ 844.98 MHz	880.02 ~ 889.98 MHz
A'	667 CH ~ 716 CH	845.01 ~ 846.48 MHz	890.01 ~ 891.48 MHz
B'	717 CH ~ 799 CH	846.51 ~ 848.97 MHz	891.51 ~ 893.97 MHz
	#. Transmitter : $1 < N < 799 : 0.03N + 825.00 \text{ MHz}$ $990 < N < 1023 : 0.03(N-1023) + 825.00 \text{ MHz}$ #. Receiver : $1 < N < 799 : 0.03N + 870.00 \text{ MHz}$ $990 < N < 1-23 : 0.03(N-1023) + 870.00 \text{ MHz}$		

### 3. General

Item	Analog mode	Digital mode
<b>Frequency Range</b> Transmitter Receiver	824.64 ~ 848.37MHz 869.64 ~ 893.37MHz	
<b>Channel Space</b>	30kHz	
<b>Numbers of Channel</b>	1024	
<b>Duplexer Space</b>	45MHz	
<b>Frequency Stability</b>	±2.5ppm	±200Hz
<b>Operating Temperature</b>	- 30°C ~ +60°C	
<b>Size and Weight</b> Including 900mAh battery Including 1200mAh battery	80(H) x 42(W) x 22.7(D) : 99g 80(H) x 42(W) x 28.5(D) : 115g	
<b>Operating Time</b> Standby time Including 900mAh battery Including 1200mAh battery Talk time Including 900mAh battery Including 1200mAh battery	30 ~ 35hr 45 ~ 55hr 70 ~ 90min 90 ~ 140min	150 ~ 220hr 130 ~ 360hr 3 ~ 4hr 4 ~ 6hr

## 4. Analog Receiver

Items	Standard Limit	*Remark																											
Electrical Audio Response (Ref : 2.2.2.1)	* refer <b>Figure1- 1</b>	A																											
Audio Muting (Ref : 2.2.2.2)	At least 40dB	M																											
Expander Output (Ref : 2.2.2.3)	For above 0dB : +/-1dB For below 0dB : +/-2dB Attack time : 3±0.6ms Recovery time : 13.5±2.7ms	A																											
Hum and Noise (Ref : 2.2.2.4)	At least 32dB	A																											
Audio Harmonic Distortion (Ref : 2.2.2.5)	Under 5%	A																											
Audio Sensitivity (Ref : 2.2.2.6)	ROLR(Receive Objective Loudness Rating) : +46dB ~ +56dB	S																											
Audio Frequency Response. (Ref : 2.2.2.7)	Level Relative to Nominal @ 1kHz <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Freq(kHz)</th> <th>Upper Limit(dB)</th> <th>Low Limit(dB)</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>-8</td> <td>no</td> </tr> <tr> <td>0.2</td> <td>+4</td> <td>no</td> </tr> <tr> <td>0.3</td> <td>+4</td> <td>-18.3</td> </tr> <tr> <td>0.5</td> <td>+4</td> <td>-5</td> </tr> <tr> <td>1.0</td> <td>+2</td> <td>-2</td> </tr> <tr> <td>3.0</td> <td>+6.8</td> <td>-10</td> </tr> <tr> <td>3.4</td> <td>+7.3</td> <td>no</td> </tr> <tr> <td>4.0</td> <td>-6.8</td> <td>no</td> </tr> </tbody> </table>	Freq(kHz)	Upper Limit(dB)	Low Limit(dB)	0.1	-8	no	0.2	+4	no	0.3	+4	-18.3	0.5	+4	-5	1.0	+2	-2	3.0	+6.8	-10	3.4	+7.3	no	4.0	-6.8	no	S
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4.0	-6.8	no																											
RF Sensitivity (Ref : 2.3.1.1)	12dB SINAD / -116dBm	A																											
Adjacent and Alternate Channel Desensitization (Ref : 2.3.1.2)	Shall be 16dB , 60dB * refer <b>Figure1-2</b>	M																											
Inter-modulation Spurious-Response Attenuation (Ref : 2.3.1.3)	Shall be 60dB for close space Shall be 70dB for wide space * refer <b>Figure1-3</b>	M																											
Protection Against Spurious-Response Interference (Ref : 2.3.1.4)	Shall be 60dB * refer <b>Figure1-4</b>	M																											
Conducted Spurious Emission (Ref : 2.4.1)	TX Band : Max Level -60dBm Rx Band : Max Level -80dBm Lowest IF freq. ~ 2.6GHz : Max Level -47dBm	M																											
RSSI (Ref : 2.6.1)	Monotonically increasing RSSI : The resolution of the RSSI shall be 5dB or less.	M																											

\*Remark A means automatic test with IIP 11807E card.

Remark M means manual test with 8920B and external equipment (signal generator etc).

Remark S means special test method: Acoustic method

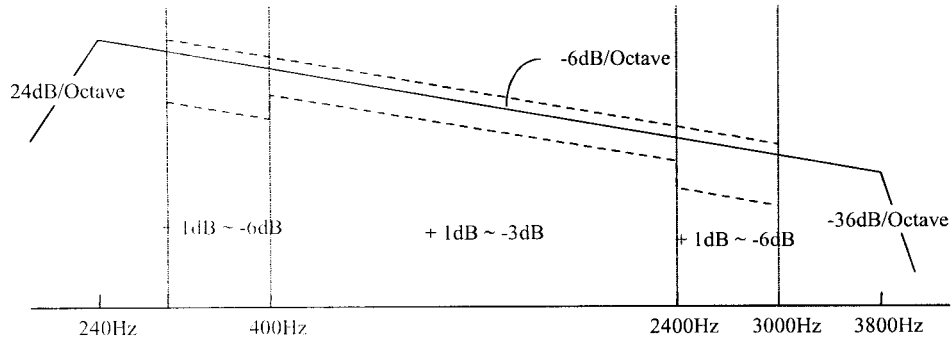


Figure1-1. Audio Frequency Output

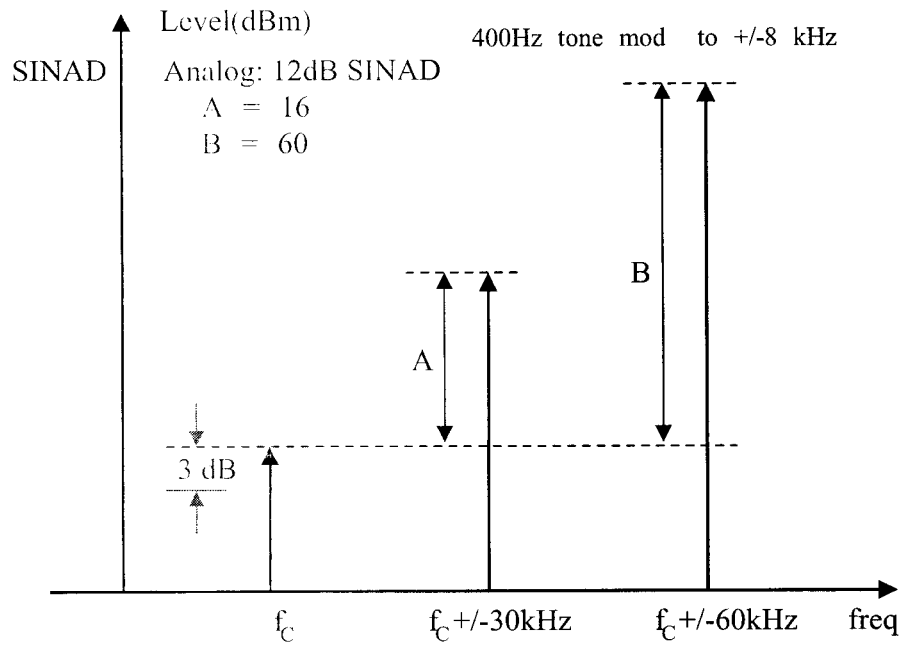
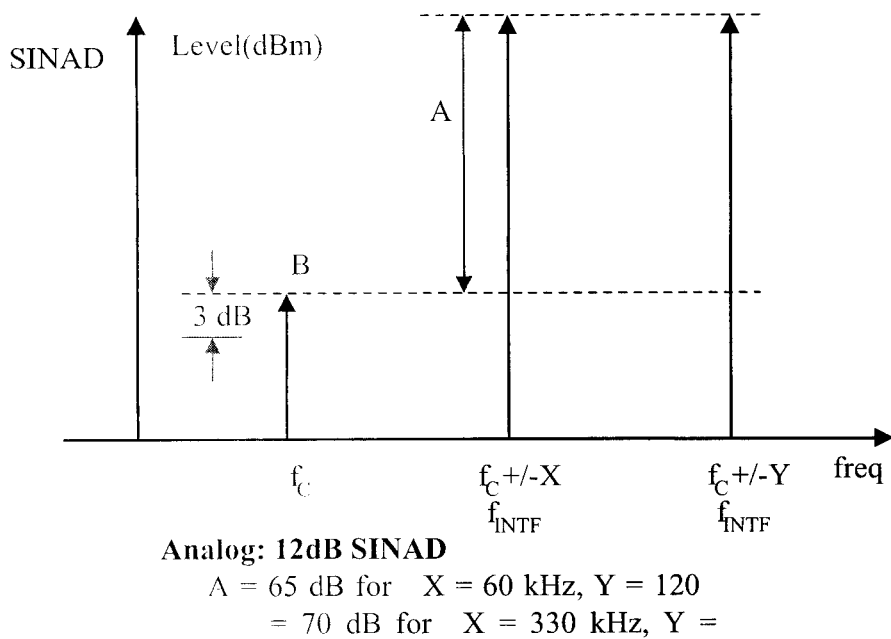
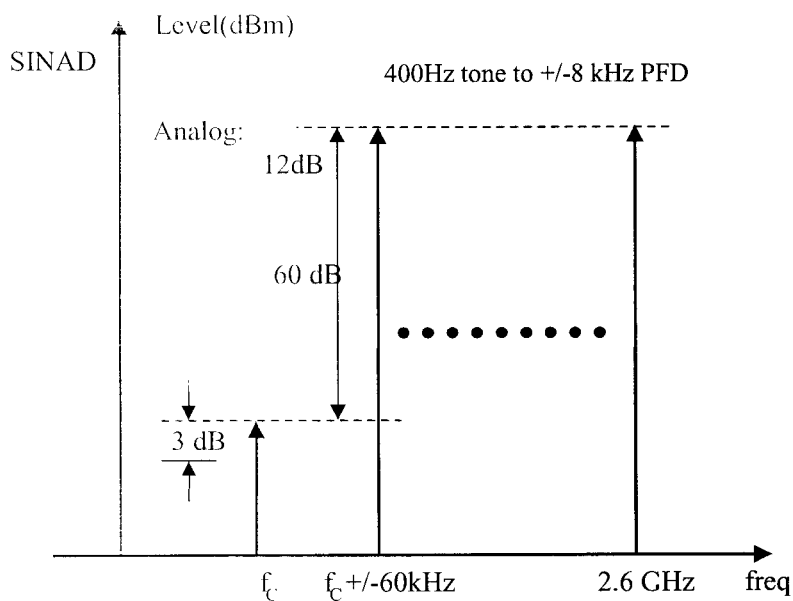


Figure1-2. Adjacent and Alternate Channel Desensitization



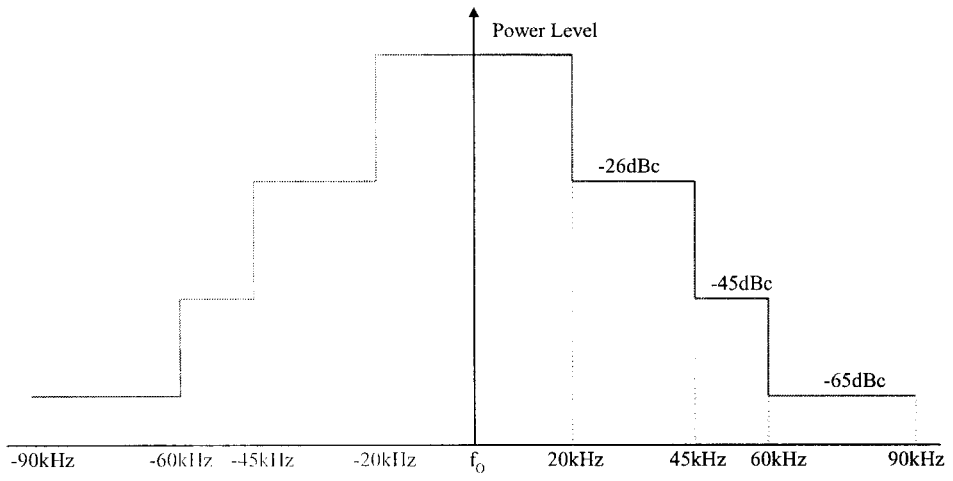
**Figure 1-3. Inter-modulation Spurious Response Attenuation**



**Figure 1-4. Protection Against Spurious-Response Interference**

## 5. Analog Transmitter

Items	Standard Limit	*remark																											
RF Power Output (Ref : 3.2.1.1)	Class IV PL 0 ~ PL2 : 28dBm +2 ~ -4dB PL3 : 24dBm +2 ~ -4dB PL4 : 20dBm +2 ~ -4dB PL5 : 16dBm +2 ~ -4dB PL6 : 12dBm +2 ~ -4dB PL7 : 8dBm +2 ~ -4dB	A																											
Power Output Transition Time (Ref : 3.2.3)	Shall not exceed 20msec to switch between any two power level	M																											
Modulation Type & Stability (Ref : 3.3.1.1)	The peak deviation shall not exceed $\pm 10\%$	A																											
Compressor Output (Ref : 3.3.1.2.1)	Input level above 0dB: $\pm 0.5$ dB. Input level below 0dB: $\pm 1$ dB Attack time : $3 \pm 0.6$ ms Recovery time : $13.5 \pm 2.7$ ms	A																											
Electrical Audio Response (Ref : 3.3.1.2.2)	From 300 to 3000Hz : -6dB/octave With +1 to -3dB range	A																											
Modulation Deviation Limiting (Ref : 3.3.1.2.3)	Peak frequency deviation $\pm 12$ kHz	A																											
Audio Voice-Path Muting (Ref : 3.3.1.2.4)	At least 40dB	M																											
Audio Frequency Response (Ref : 3.3.1.2.5)	Level Relative to Nominal @ 1kHz <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Freq(kHz)</th> <th>Upper Limit(dB)</th> <th>Low Limit(dB)</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>-4</td> <td>no</td> </tr> <tr> <td>0.2</td> <td>+2</td> <td>no</td> </tr> <tr> <td>0.3</td> <td>+2</td> <td>-12.5</td> </tr> <tr> <td>1.0</td> <td>+2</td> <td>-2</td> </tr> <tr> <td>2.0</td> <td>+14</td> <td>-2</td> </tr> <tr> <td>3.0</td> <td>+14</td> <td>-9</td> </tr> <tr> <td>3.4</td> <td>+14</td> <td>no</td> </tr> <tr> <td>4.0</td> <td>-4.8</td> <td>no</td> </tr> </tbody> </table>	Freq(kHz)	Upper Limit(dB)	Low Limit(dB)	0.1	-4	no	0.2	+2	no	0.3	+2	-12.5	1.0	+2	-2	2.0	+14	-2	3.0	+14	-9	3.4	+14	no	4.0	-4.8	no	S
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4.0	-4.8	no																											
Audio Sensitivity (Ref : 3.3.1.2.6)	TOLR should have a nominal value of -46dB The range is -38 to -51dB	S																											
Wideband Data (Ref : 3.3.1.3)	$\pm 8$ kHz Peak frequency deviation with $\pm 10\%$ tolerance	A																											
Hum and Noise (Ref : 3.3.1.6)	At least 32dB	A																											
Modulation Distortion and Noise (Ref : 3.3.1.8)	Under 5%	A																											
Noise Suppression – Broadband (Ref : 3.4.1.1)	* refer <b>Figure 1-5</b>	M																											
Harmonic & Spurious Emission-Conducted (Ref : 3.4.2.1)	Tx Band : $43 + 10[\log(\text{mean output power in Watts})]$ dB Rx Band : -80dBm/30kHz	M																											



*Figure I-5.* Spectrum Noise Suppression- Broadband

## 6. Digital Receiver

Items	Standard Limit	*remark																											
Audio Sensitivity (Ref : 2.2.4.1)	ROLR(Receive Objective Loudness Rating) : +51dB +46dB ~ +56dB	S																											
Audio Frequency Response. (Ref : 2.2.4.3)	Level Relative to Nominal @ 1kHz <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Freq(kHz)</th> <th>Upper Limit(dB)</th> <th>Low Limit(dB)</th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>-8</td> <td>no</td> </tr> <tr> <td>0.2</td> <td>+4</td> <td>no</td> </tr> <tr> <td>0.3</td> <td>+4</td> <td>-18.3</td> </tr> <tr> <td>0.5</td> <td>+4</td> <td>-5</td> </tr> <tr> <td>1.0</td> <td>+2</td> <td>-2</td> </tr> <tr> <td>3.0</td> <td>+6.8</td> <td>-10</td> </tr> <tr> <td>3.4</td> <td>+7.3</td> <td>no</td> </tr> <tr> <td>4.0</td> <td>-6.8</td> <td>no</td> </tr> </tbody> </table>	Freq(kHz)	Upper Limit(dB)	Low Limit(dB)	0.1	-8	no	0.2	+4	no	0.3	+4	-18.3	0.5	+4	-5	1.0	+2	-2	3.0	+6.8	-10	3.4	+7.3	no	4.0	-6.8	no	S
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4.0	-6.8	no																											
Receiver Signal Level Range Capability (Ref :2.3.2.1)	At Rx level -110dBm : BER 3% under -25dBm : BER 3% under	M																											
Adjacent and Alternate Channel Desensitization (Ref : 2.3.2.2)	BER Shall be less than or equal to 3% * refer <b>Figure1-6</b>	M																											
Inter-modulation Spurious Response Attenuation (Ref : 2.3.2.3)	BER Shall be less than or equal to 3% * refer <b>Figure1-7</b>	M																											
Blocking & Spurious Response Rejection (Ref : 2.3.2.4)	BER Shall be less than or equal to 3% * refer <b>Figure1-8</b>	M																											
Conducted Spurious Emission (Ref : 2.4.1)	TX Band : Max Level -60dBm Rx Band : Max Level -80dBm Lowest IF freq. ~ 2.6GHz : Max Level -47dBm	M																											
RSSI(Ref : 2.6.2)	* refer <b>Figure1-9</b>	M																											

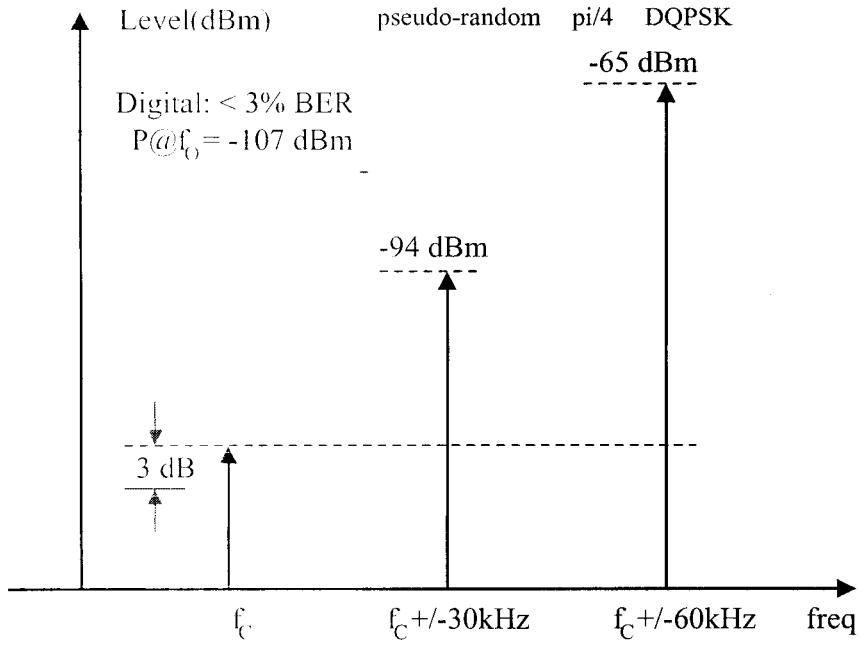


Figure 6. Adjacent and Alternate Channel Desensitization

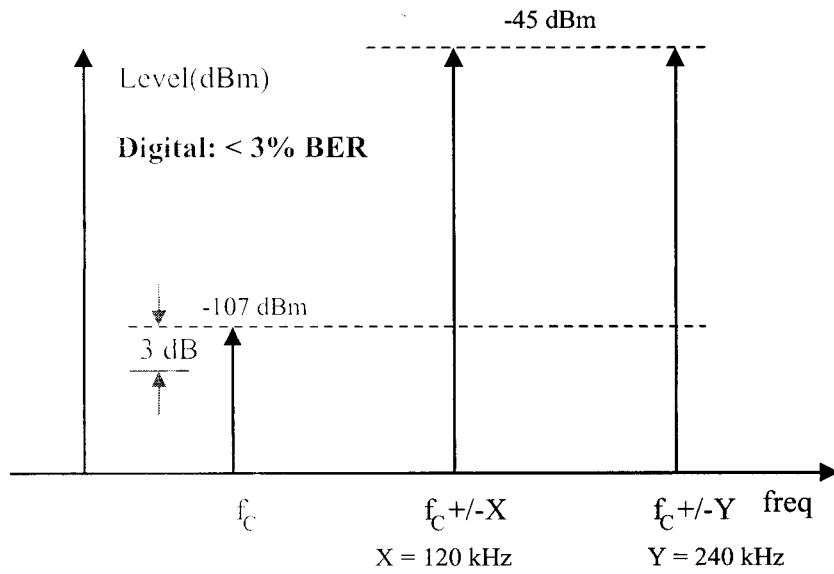


Figure 7. Intermodulation Spurious Response Attenuation

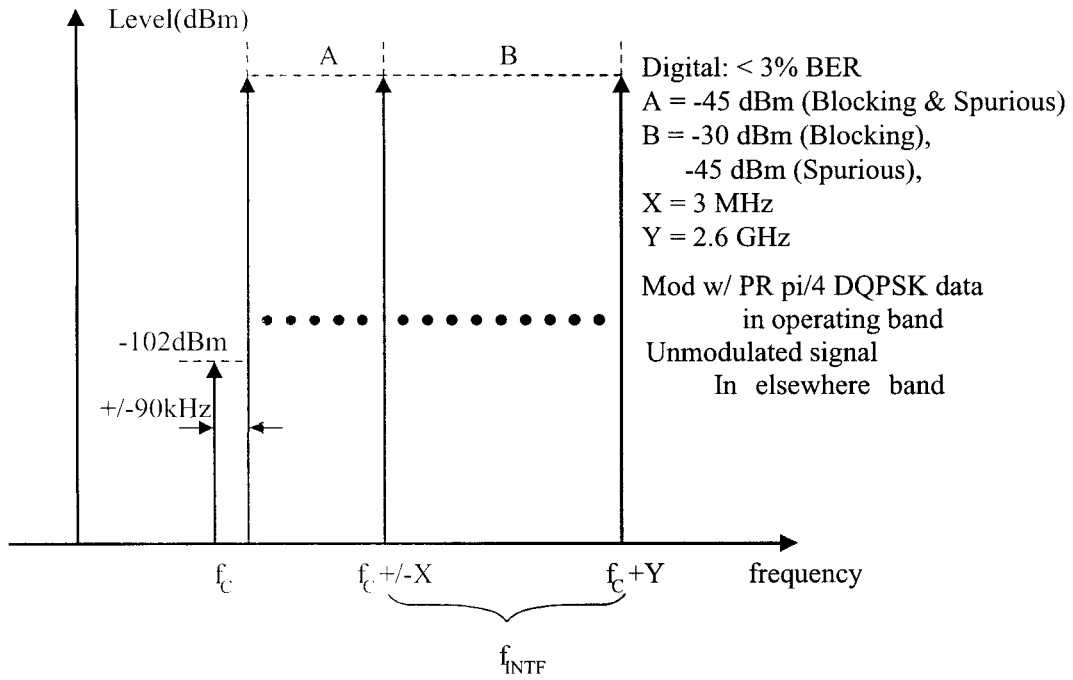


Figure 1-8. Blocking & Spurious Response Rejection

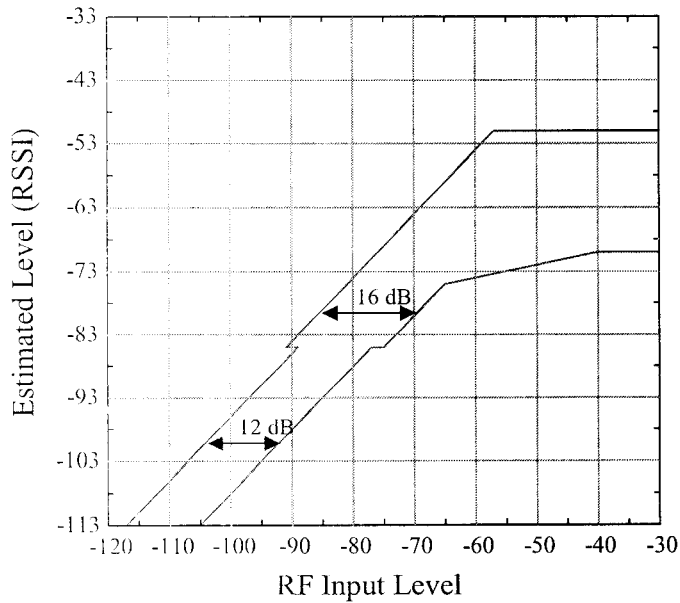
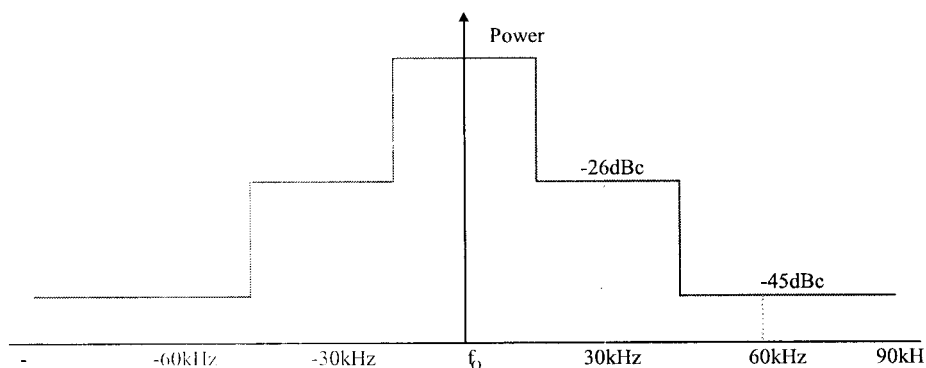


Figure 1-9. Absolute RSSI Accuracy

## 7. Digital Transmitter

Items	Standard Limit	*remark
RF Power Output (Ref : 3.2.1.2)	Class IV PL 0 ,1 ,2 : 28dBm +2dB ~ -4dB PL3 : 24dBm +2dB ~ -4dB PL4 : 20dBm +2dB ~ -4dB PL5 : 16dBm +2dB ~ -4dB PL6 : 12dBm +2dB ~ -4dB PL7 : 8dBm +2dB ~ -4dB PL8 : 3dBm +2dB ~ -6dB PL9 : -2dBm +2dB ~ -6dB PL10 : -7dBm +2dB ~ -6dB	A
Modulation Type and Accuracy (Ref : 3.3.2.1)	The RMS vector error shall be less than 12.5% The frequency offset shall be less than -20dBc	A
Audio Frequency Response.	Level Relative to Nominal @ 1kHz Freq(kHz) Upper Limit(dB) Low Limit(dB) 0.1 -4 no 0.2 +2 no 0.3 +2 -12.5 1.0 +2 -2 2.0 +14 -2 3.0 +14 -9 3.4 +14 no 4.0 -4.8 no	S
Audio Sensitivity (Ref : 3.3.2.2.3)	TOLR(Trasmitter Objective Loudness Rating) : -46dB (range -38dB ~ -51dB)	S
Adjacent & Alternate Channel Power due to Modulation (Ref : 3.4.1.2)	* refer <i>Figure1-10</i>	A
Harmonic & Spurious Emission ( conducted) (Ref : 3.4.2.2)	Tx band( $F_c \pm 12\text{kHz}$ ) : 45dBc Rx band : shall not exceed -80dBm/30kHz	M



*Figure1-10. Adjacent & Alternate Channel Power due to Modulation*

## 8. Environmental Requirements

<b>Operating Temperature</b>	<b>- 30° C ~ +60° C</b>	<b>Limit</b>
<b>High Humidity</b>	<b>+50° C , 40% relative humidity</b>	
<b>Analog Mode</b>	Receiver Sensitivity Transmitter Deviation Stability	-113dBm Min ±15% Max
<b>Digital Mode</b>	Receiver Sensitivity static(BER 3%) : Min Receiver Sensitivity faded 100km/h(BER 3%) The Transmitter Modulation Origin Offset The Transmitter Modulation Vector Error The Transmitter Audio Sensitivity Receiver Audio Frequency Response Transmitter Audio Frequency Response	-107dBm 100dBm Min 20dBc Max 15% Max -38 ~ -54dB ±8dB at 1kHz over ±8dB at 1kHz over