

Consultation Summary of Japanese 920MHz Band Rules and Conditions

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Note: This document is supposed to be re-submitted using ppt file format.

Back Ground

Following up the recent spectrum reform of entire UHF frequency usage in Japan due to termination of analog TV broadcasting service, current 950MHz band shared by WSN (wireless sensor network) and RFID is going to move to so called 920MHz band. As new 920MHz band is substantially expanded in bandwidth and still partially shared by RFID, the rules and conditions to be fulfilled by WSN devices are changed.

The corresponding consultation has been issued by telecommunication council of MIC* in June, and the actual law ordinances are expected to be in effect by July 2012. In addition, ARIB T-96 standard is going to be revised as well, which recommends a series of provisions prescribing additional rules concerning WSN on mandated regulatory ordinances.

This submission summarizes mainly with regard to MIC* consultation.

* MIC : Ministry of internal affair and Communication

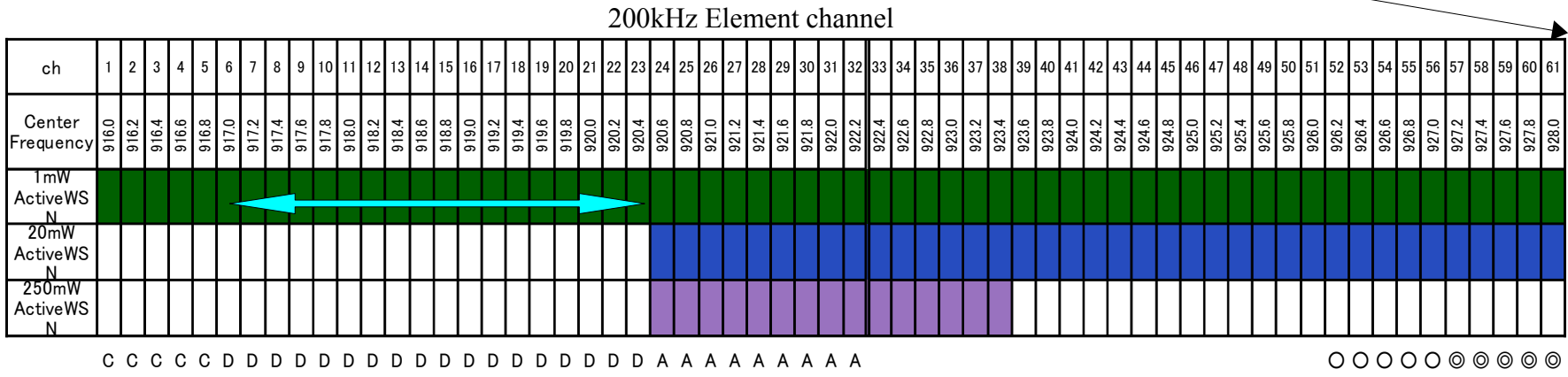
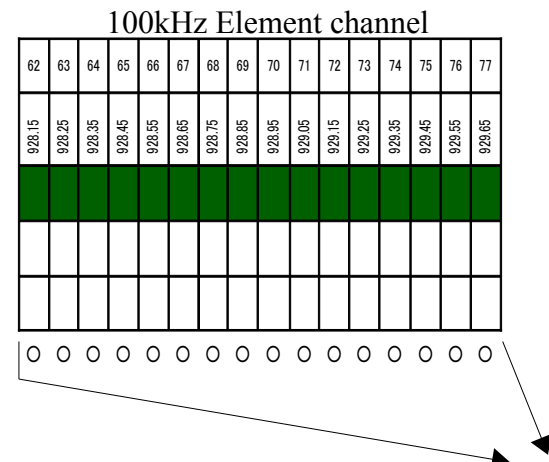
Frequency band and Element channel width

WSN Frequency band and Channelization

- **Frequency Band : 915.9MHz - 929.7MHz**
- **200kHz width element channel : 915.9 - 928.1MHz (61 channels)**
- **100kHz width element channel : 928.15 - 929.56 (16 channels)**
- **Shared region with Passive RFID system : 915.9 - 923.5MHz**

- **Limited channel usages depending on each Tx power levels.**

920MHz Band Channel Plan of WSN Systems (Based on Consultation)



Active Low Power Systems including Active RFID & WSN

Specific Low Power (250mW)
 Specific Low Power (20mW)
 Specific Low Power (1mW)

Arib Std. defines additional usage condition and restriction of A,B,C,D channels

- A(24ch—32ch) : are supposed to use for passive ID with longer LBT period in ARIB Std.
- B(33ch—38ch) : are supposed to use for active RFID and WSN with shorter LBT period in ARIB Std.
- C(1ch—5ch) : are supposed to use for both data return Ch. of MS passive ID and active systems which require World Wide compatibility including international logistic applications.
- D(6ch—23ch) : are supposed to primarily use for data return Ch. of passive ID systems in ARIB Std.

System (WSN) Category

Category (Based on maximum Tx Power)	
1mW (3dBm eirp)	no more than 1mW(0dBm) Tx power: 915.9-928.1MHz, 61x 200kHz element channels (Recommended use by ARIB T-96 is 915.9-916.9MHz and 920.5-928.1MHz and 928.1-929.7MHz)
20mW (16dBm eirp)	no more than 20mW(13dBm) Tx power: 920.5-928.1MHz, 38x 200kHz elementary channels (Ditto is 922.3-928.1MHz)
250mW (27dBm eirp)	no more than 250mW(24dBm) Tx power: 920.5-923.5MHz, 15x 200kHz elementary channels (Ditto is 922.3-923.5MHz)

Data Transmission

Modulation Scheme	Not specified, i.e. any modulation can be used.
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Bundled usage of Element channels (~ max. occupied signal width)

Maximum number of Element channels	Up to 5 channels, (1MHzBWmax.) c.f. 0.5MHzBWmax. for 928.1-929.7MHz
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Conditions & Rules in term of Tx Control

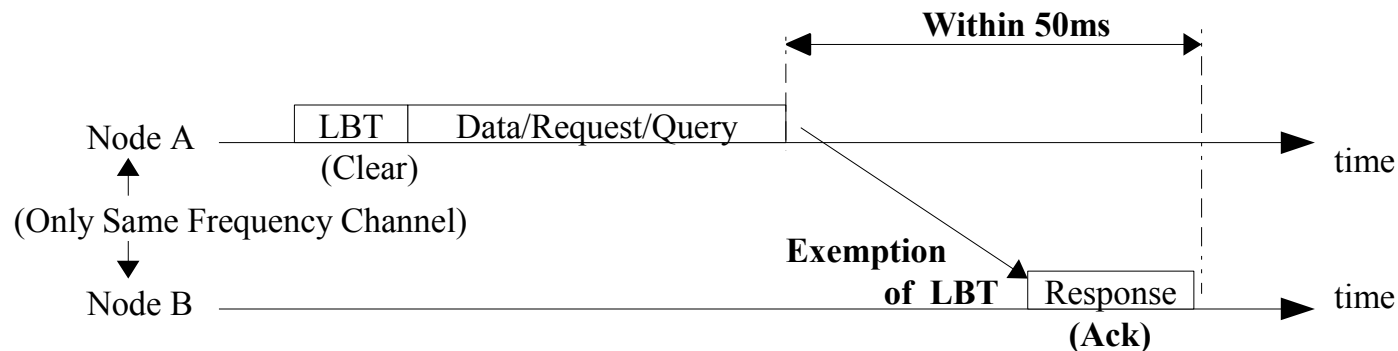
Tx Control with regard to System Conditions

LDC		
1mW category	3.6s per 1 hour	Less than 0.1%
20mW or 250mW Category	360s per 1 hour	Less than 10%
	not required (LBT>5ms)	within 4s max. Tx followed by 50ms idle at 920.5MHz-923.5MHz.
Max. Transmission Duration		
1mW Category	100ms	for 200KHz element channels, 50ms for 100KHz cases.
20mW or 250mW Category	400ms (LBT>128us) 4s (LBT>5ms)	(ARIB T-96 recommends 200ms or 100ms in some conditions) 4s (LBT>5ms) is only permitted for 920.5MHz-923.5MHz.
Idle period after Transmission		
1mW Category	100ms	for 200KHz element channels, 50ms for 100KHz cases.
20mW or 250mW Category	2ms (LBT>128us) 50ms (LBT > 5ms)	(not required if Tx duration was no more than 6ms) 50ms (LBT>5ms) is only valid for 920.5MHz-923.5MHz.
LBT requirement		
1mW Category	not required	
20mW or 250mW Category	listen more than 128us	-80dBm (ED) regardless of bundled number of channels.
	listen more than 5ms	LBT>5ms is only valid for 920.5MHz-923.5MHz.

(ARIB std. T-96 recommends a few conditions in addition to law ordinance as above.)

Exception of LBT

- Short Response including Ack frame following Data, Request and query needs no LBT, if Tx completes within 50ms on same channel.



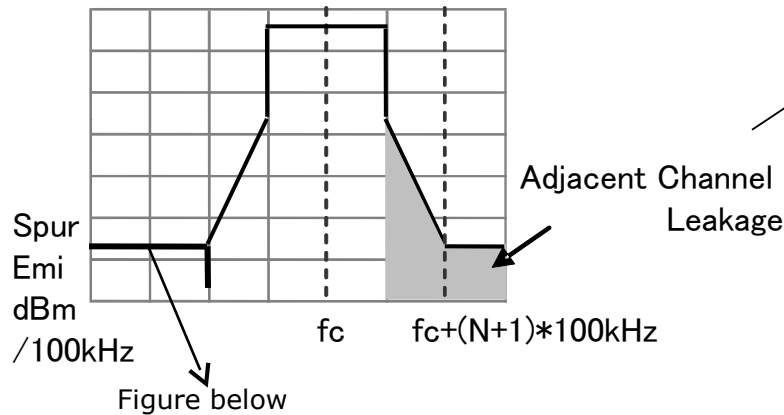
- Short Response don't have to be taken account into LDC.
e.g. 360s per 1hour limit is not affected by Ack response.

(ARIB std. T-96 recommends a few additional conditions over law ordinance above.)

Adjacent Leakage Power & Spurious Emission

Adjacent Leakage & Spurious Emission

Provision of Channel Mask

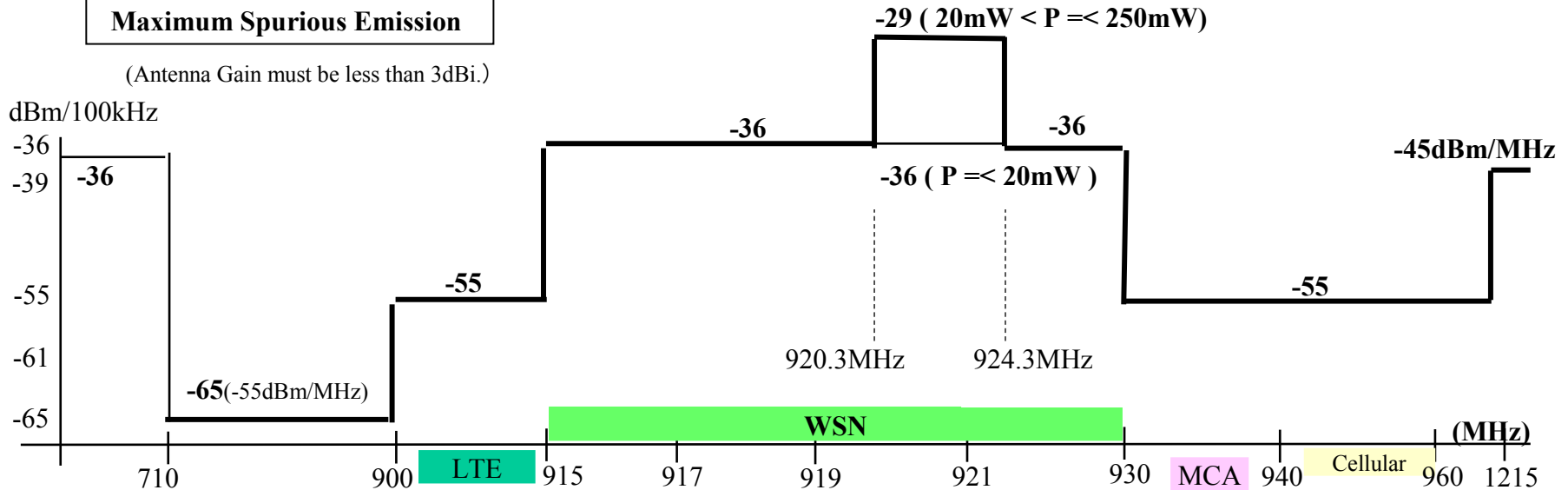


Adjacent Channel Leakage

Category	Max. Leakage
200kHz adjacent element channel	
(output power: P)	
(dBm/200kHz)	
P =< 250mW	-5dBm
P =< 20mW	-15dBm
P =< 1mW	-26dBm

Maximum Spurious Emission

(Antenna Gain must be less than 3dBi.)



Allowed Spurious Emission

Frequency Region (at Tx output to Antenna)	Max. Spurious Emission (Average Power)	Reference Bandwidth
Lower than or equal to 710MHz	-36dBm	100kHz
Higher than 710MHz and up to 900MHz	-55dBm	1MHz
Higher than 900MHz and up to 915MHz	-55dBm	100kHz
Higher than 915MHz and up to 920.3MHz *	-36dBm	100kHz
Higher than 920.3MHz and up to 924.3MHz * (except for the region within (200+100 n) KHz; n=number of bundled element channels)	-29dBm : (Tx power >20mW) -36dBm : (otherwise)	100kHz
Higher than 924.3MHz and up to 928.1MHz * (except for the region within (200+100 n) KHz; n=number of bundled element channels)	-36dBm	100kHz
Higher than 928.1MHz and up to 930MHz (except for the region within (100+50 n) KHz; n=number of bundled element channels)	-36dBm	100kHz
Higher than 930MHz and up to 1GHz	-55dBm	100kHz
Higher than 1GHz and up to 1.215GHz	-45dBm	1MHz
Beyond 1.215GHz	-30dBm	1MHz

Emission from enclosure has to be less than the corresponding EIRP value with above value. Max. Antenna Gain is 3dBi.

Parasitic Emission of Rx

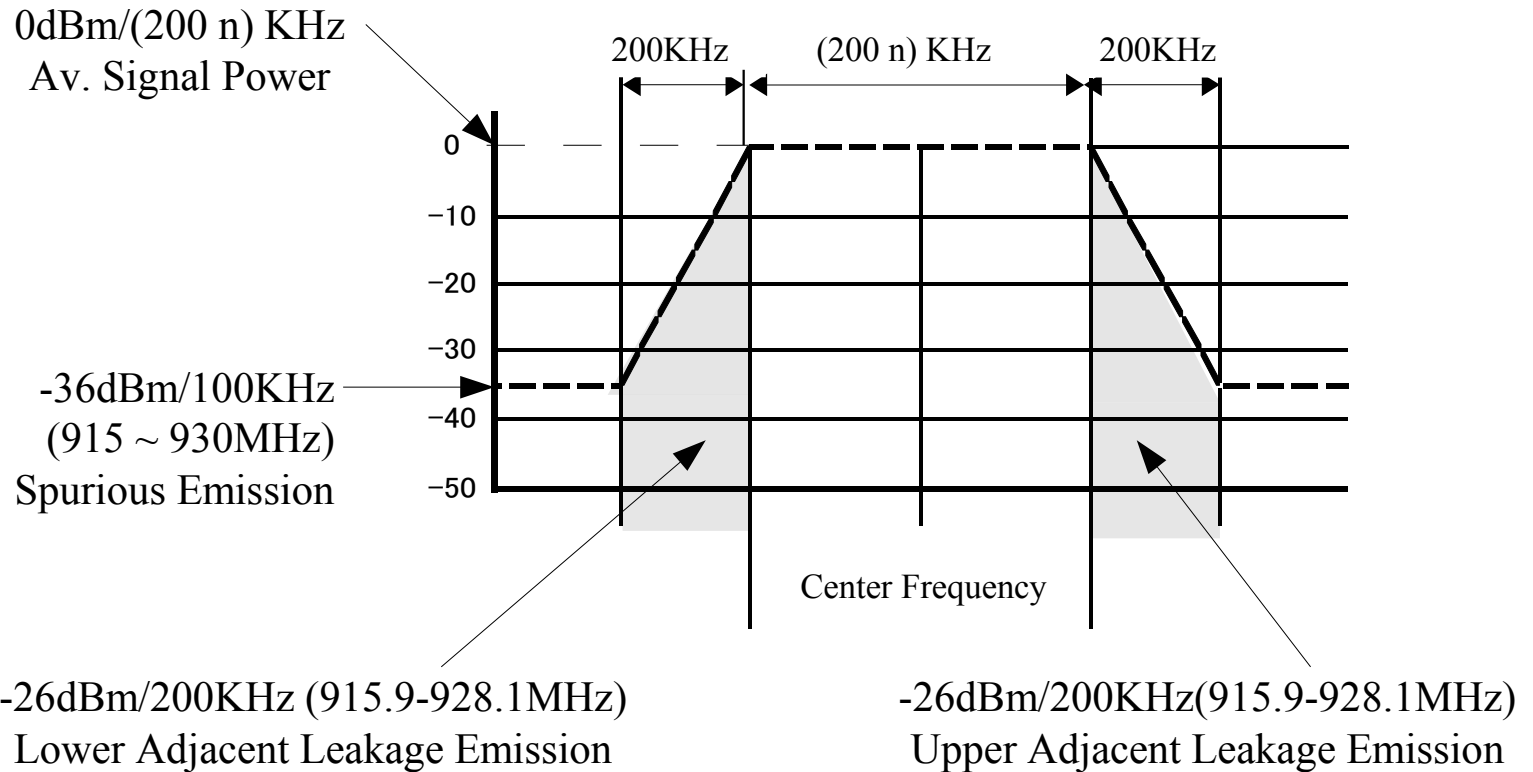
Frequency Region (at Tx output to Antenna)	Max. Spurious Emission (Average Power)	Reference Bandwidth
Lower than or equal to 710MHz	-54dBm	100kHz
Higher than 710MHz and up to 900MHz	-55dBm	1MHz
Higher than 900MHz and up to 915MHz	-55dBm	100kHz
Higher than 915MHz and up to 930MHz	-54dBm	100kHz
Higher than 930MHz and up to 1GHz	-55dBm	100kHz
Beyond 1GHz	-47dBm	1MHz

- Be measured at the condition that Rx operation has to be activated, while Tx circuitry may be disabled.
- A measurement using temporal antenna terminal is allowed in both case of measurements in term of Tx spurious emission and Rx parasitic emission, provided that the loss difference between real antenna and temporal terminal has to be compensated.

Typical Signal Masks

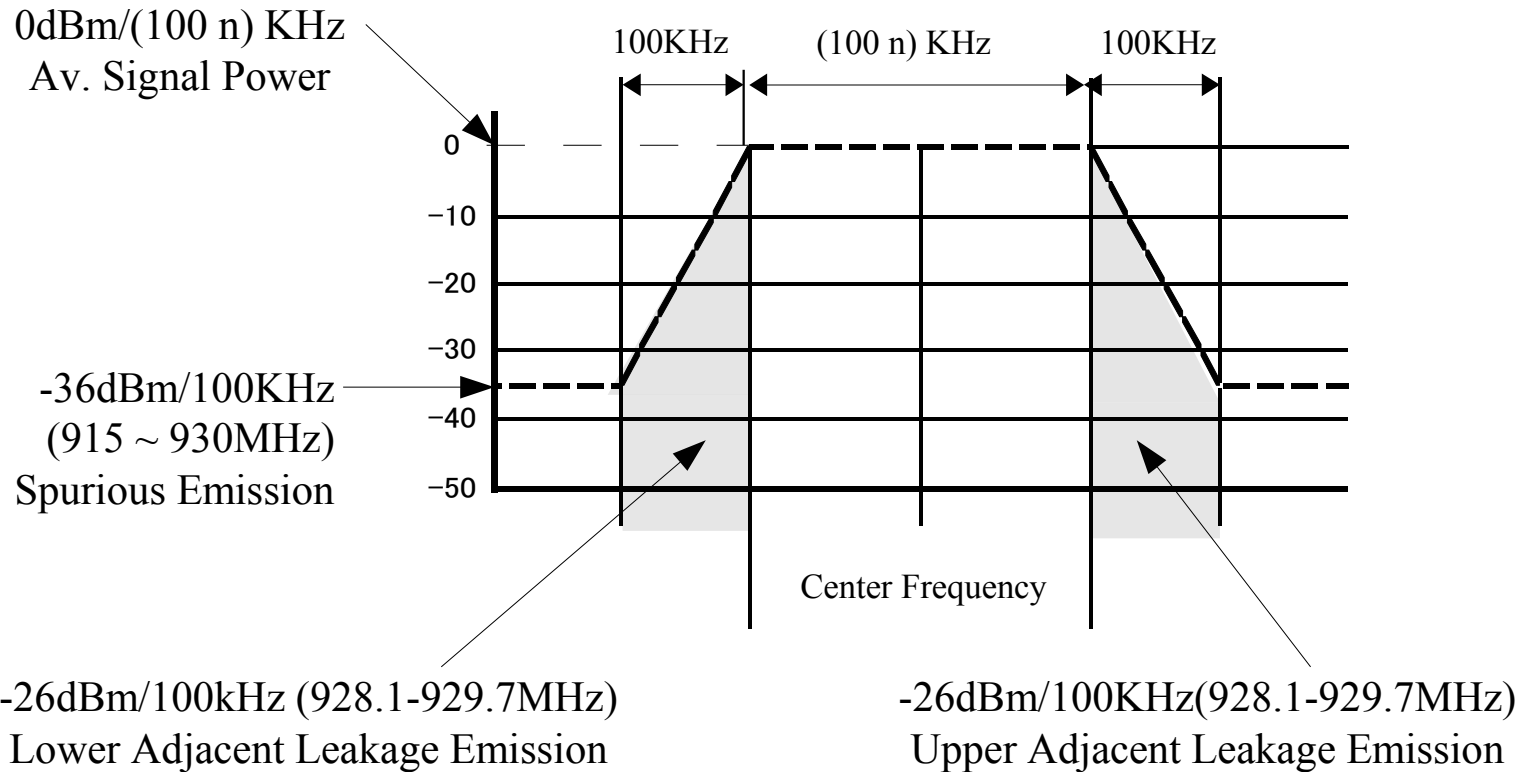
Typical Signal Mask

< 1mW Category (915.9 ~ 928.1MHz) >



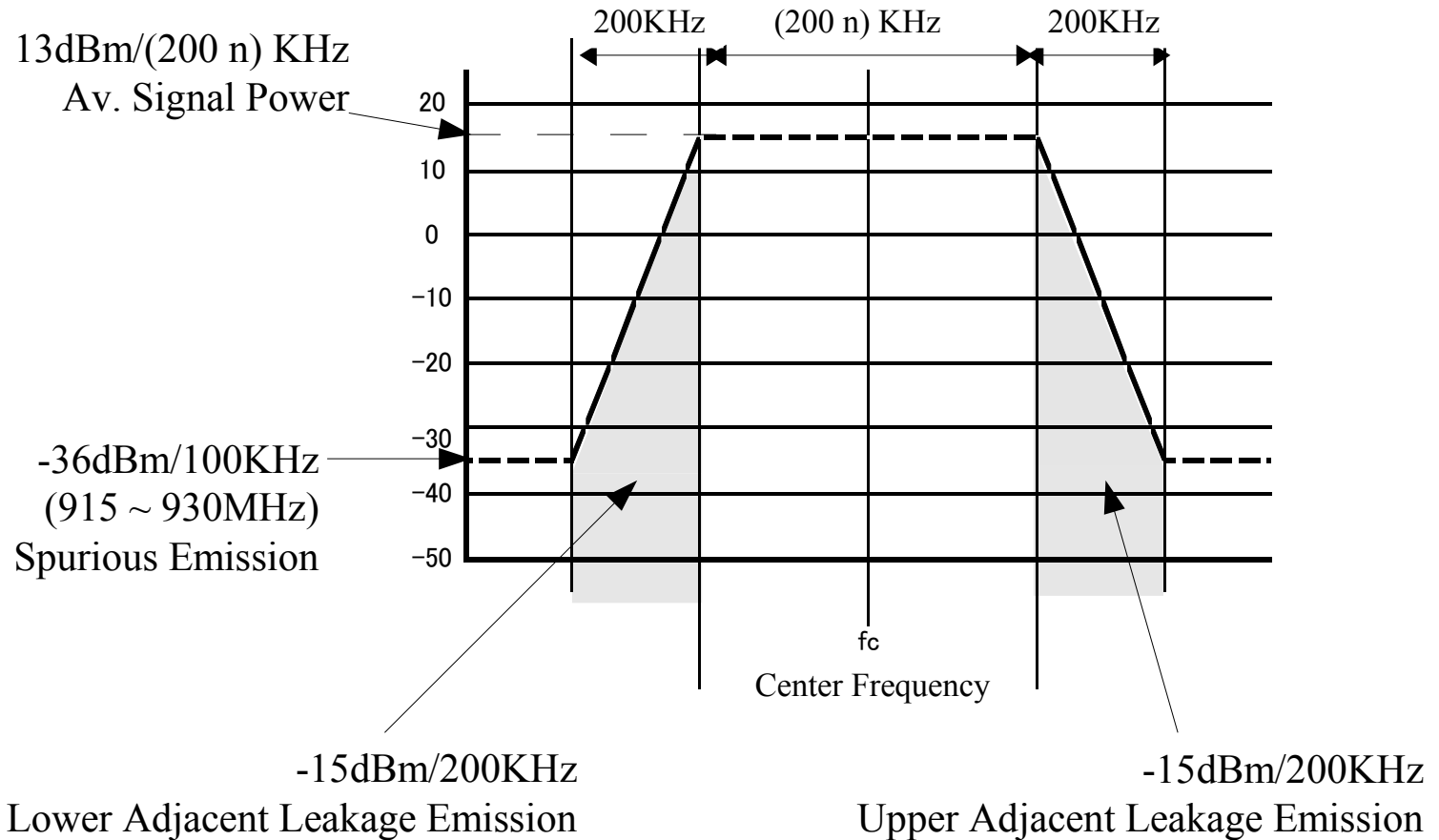
Typical Signal Mask

< 1mW Category (928.1 ~ 929.7MHz) >



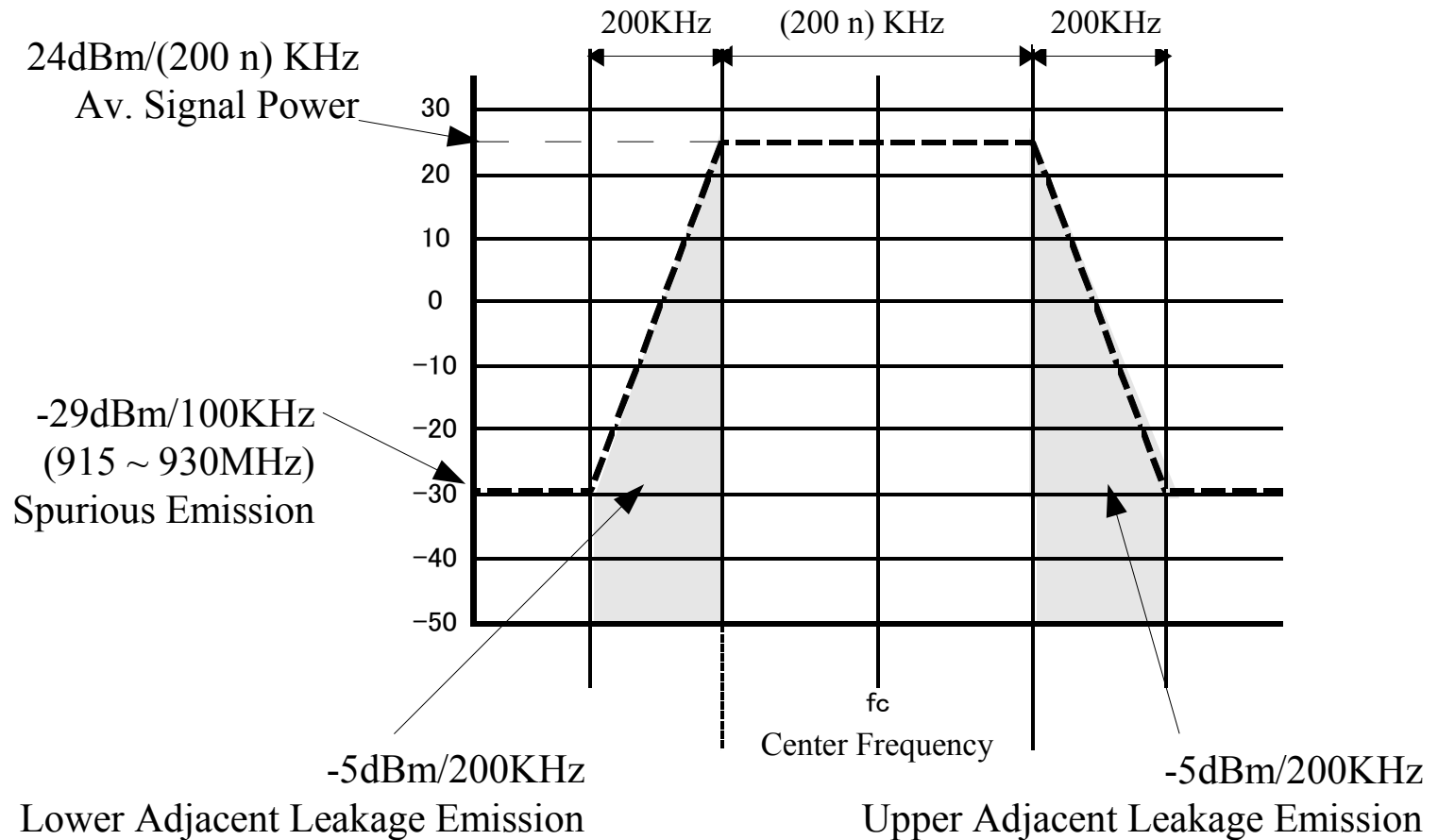
Typical Signal Mask

< 20mW Category (920.5 ~ 928.1MHz) >



Typical Signal Mask

< 250mW Category (920.5 ~ 923.5MHz) >



Miscellaneous

Frequency Tolerance

- **Within ± 20 ppm**

Tx power Tolerance

- **Between +20% and -80% of the designed power level**

Antenna Gain

- **+3dBi max. with max. Tx power allowed.**
- **Higher gain antenna is allowed to use, provided that EIRP level is kept below than that with max. Tx power using +3dBi antenna.**

Permitted Communication

- **Simplex (with or without Rx), Duplex (FDD, CDD, etc.), half Duplex (TDD), Broadcast and Multicast.**

< Reference >

Consultation Report
by
mobile communication committee
of
Information Communication Technology sub-party
of
Telecommunication Council.

Issued on Jun. 24, 2011.

- **Press Release of MIC (written in Japanese)**
< http://www.soumu.go.jp/menu_news/s-news/0kiban14_01000036.html >
- **Summary Table of 920MHz RFID/WSN systems (written in Japanese)**
< http://www.soumu.go.jp/main_content/000119517.pdf >
- **Consultation Report for public comments (written in Japanese)**
< http://www.soumu.go.jp/main_content/000113160.pdf >

Note : ARIB std. T-96 is supposed to be issued in English in future, which will be including the law ordinances and ARIB recommendations together.

End