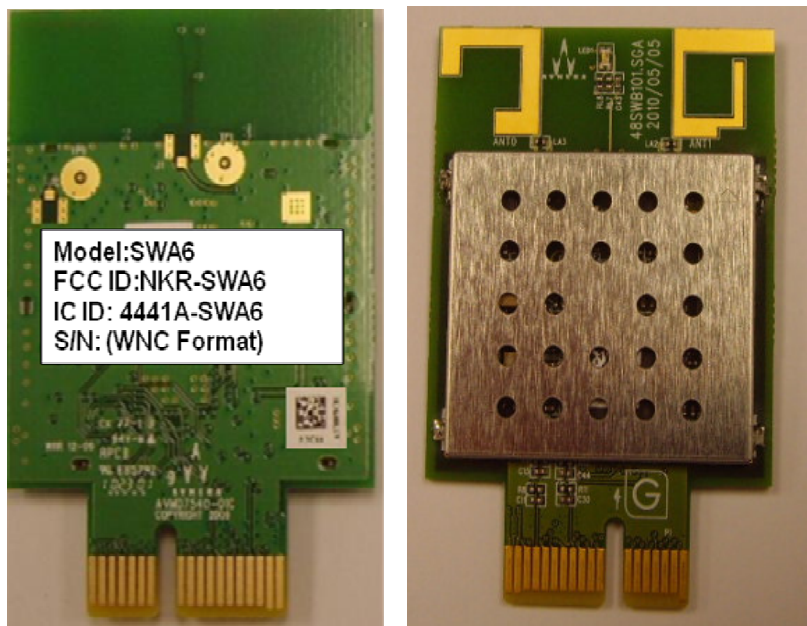**Wistron®**
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Product Specification

Model Name: AVMD7540-SWA6
(AV7540 +16dBm module with Printing Antenna)

Revision: 1.0
Issue Date: 2010/09/20

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Revision History

Edition #	Reason for revision	Issue date	Author
0.1	Draft (Initial Revision)	2010/07/23	Amy Tu
1.0	Add FCC Descripti	2010/9/20	Amy Tu

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Wistron NeWeb Corporation

20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.
Phone: 886-3-666-7799   Fax: 886-3-666-7711
Website: www.wneweb.com

1. General Description

The AVMD7540-SWA6 module is a complete radio module solution containing all the necessary HW and FW to provide a system-integration ready, multichannel wireless HD audio solution.

The module is comprised of a AV7540 IC combined with RF front-end circuits (RF PA + balun + filter + RF switch), flash memory, crystal, and passive components. The module provides a convenient set of digital I/O interfaces for digital audio through an I2S port, host MCU control through an SPI or I2C interface and optional GPIO for various control and indicator functions.

The module is a card edge style using the 36 pin PCIe card edge connection method to save space and cost in connecting to the main board.

FCC & IC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the exemption from the routine evaluation limits in section 2.5 of RSS 102.
1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters from user and bystanders.
The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102

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Website: www.wneweb.com

2. Features

✓ **Complete, Integrated Wireless Module**
  ○ AV7540 IC
  ○ RF front-end
  ○ Flash memory

✓ **High Performance Audio and RF solution**
  ○ 16 bit, 48kHz to 24 bit, 96kHz digital audio
  ○ 120dB SNR Digital Audio Path
  ○ Fixed Low Latency solution
  ○ +16dBm transmit RF output power
  ○ -82dBm receive RF sensitivity
  ○ Support for 30m/100m range NLOS/LOS

✓ **Digital interfaces and Audio**
  ○ 8 channel digital audio I/O (4 I2S ports)
    ▪ Configurable as input or output
  ○ Stereo audio DAC output
  ○ 4-wire SPI slave interface or 2-wire I2C-compatible communication with the host MCU

✓ **Package and connections**
  ○ Compact size
  ○ 36 pin (2x18) PCIe card edge connector
  ○ diversity antenna capability

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20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.
Phone: 886-3-666-7799   Fax: 886-3-666-7711
Website: www.wneweb.com

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3. Block Diagram

AVMD7540 Module

/
4. Module Outline

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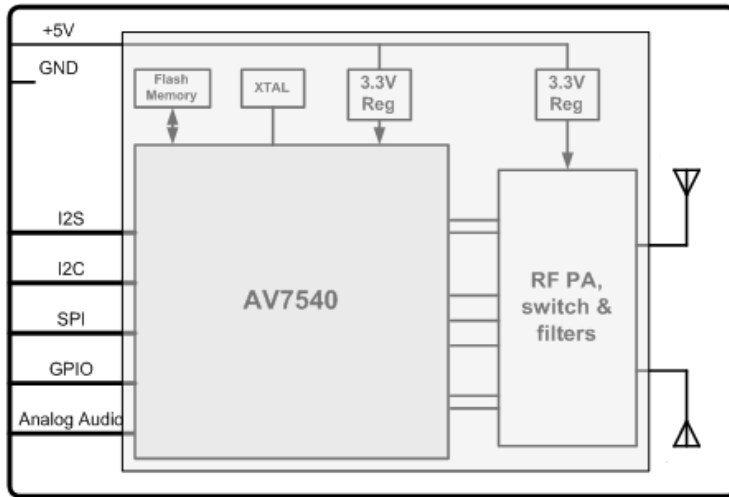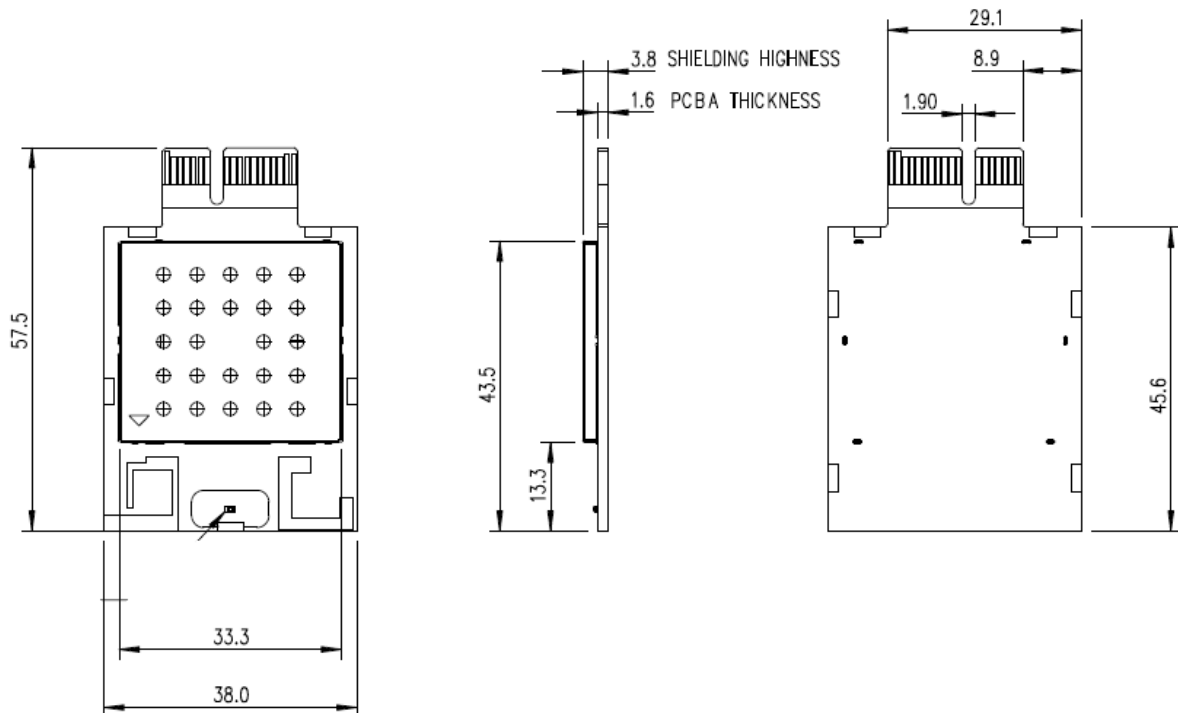
5. Pin Configuration and Definition

Top View
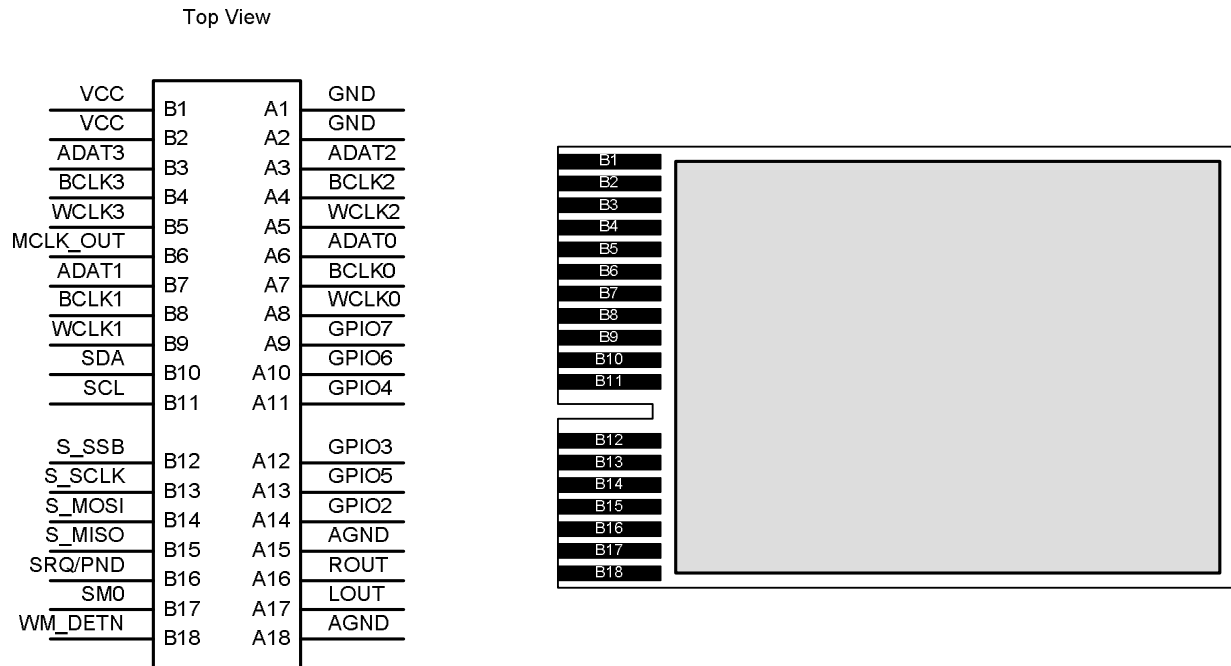
Figure 1-1 – AVMD7540-SWA6 module pin configuration

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Website: www.wneweb.com

Table 錯誤! 所指定的樣式的文字不存在文件中。-1 AVMD7540-SWA6 pin description

#	Pin Name	Pin Type	Description
A1	GND	Analog	Module ground
A2	GND	Analog	Module ground
A3	WCLK2	Digital I/O	I2S Word clock, AV75xx physical I2S I/O # 2 – input/output
A4	BCLK2	Digital I/O	I2S Bit clock, AV75xx physical I2S I/O # 2 – input/output
A5	ADAT2	Digital I/O	I2S audio data, AV75xx physical I2S I/O #2 – input/output
A6	WCLK0	Digital I/O	I2S Word clock, AV75xx physical I2S I/O # 0 – input/output
A7	BCLK0	Digital I/O	I2S Bit clock, AV75xx physical I2S I/O # 0 – input/output
A8	ADAT0	Digital I/O	I2S audio data, AV75xx physical I2S I/O # 0 – input/output
A9	SPI/TWI_SEL	Digital I/O	SPI / TWI interface selection (SPI = 0, TWI = 1)
A10	GPIO6	Digital I/O	GPIO #6
A11	GPIO4	Digital I/O	GPIO #4
A12	GPIO3	Digital I/O	GPIO #3
A13	GPIO5	Digital I/O	GPIO #5
A14	reserved	Digital I/O	reserved
A15	AGND	Analog	Audio ground
A16	ROUT	Analog	Audio DAC right channel output
A17	LOUT	Analog	Audio DAC left channel output
A18	AGND	Analog	Audio ground
B1	VCC	Analog	+5V supply voltage input
B2	VCC	Analog	+5V supply voltage input
B3	ADAT3	Digital I/O	I2S audio data, AV75xx physical I2S I/O # 3 – input/output
B4	BCLK3	Digital I/O	I2S Bit clock, AV75xx physical I2S I/O # 3 – input/output
B5	WCLK3	Digital I/O	I2S Word clock, AV75xx physical I2S I/O # 3 – input/output
B6	MCLK_OUT	Digital Output	MCLK for I2S audio data
B7	ADAT1	Digital I/O	I2S audio data, AV75xx physical I2S I/O # 1 – input/output
B8	BCLK1	Digital I/O	I2S Bit clock, AV75xx physical I2S I/O # 1 – input/output
B9	WCLK1	Digital I/O	I2S Word clock, AV75xx physical I2S I/O # 1 – input/output
B10	SDA	Digital I/O	I2C compatible serial data I/O
B11	SCL	Digital I/O	I2C compatible serial clock I/O
B12	S_SSB	Digital I/O	SPI Slave – slave select (active low)
B13	S_SCLK	Digital I/O	SPI Slave – serial clock
B14	S_MOSI	Digital I/O	SPI Slave – master out slave in
B15	S_MISO	Digital I/O	SPI Slave – master in slave out
B16	SRQ/PND	Digital Output	Notification signal to host (pending notification)
B17	SM0	Digital Input	Serial Mux control (for flash programming) and module reset (active low)

Wistron NeWeb Corporation

20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.
Phone: 886-3-666-7799 Fax: 886-3-666-7711
Website: www.wneweb.com

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6. Electrical Specifications

6.1. Absolute Maximum Ratings

The Absolute Maximum Rating (AMR) corresponds to the maximum value that can be applied without leading to instantaneous or very short-term unrecoverable hard failure (destructive breakdown). Absolute Maximum Ratings are stress ratings only. Permanent damage to the device may be caused by continuously operating at or beyond these limits. Device functional operating limits and guaranteed performance specifications are given under Electrical Characteristics at the test conditions specified.

Table 6-1 6-2 AVMD7540-SWA6 Absolute Maximum Ratings

CONDITION	MIN	MAX	Units
Supply (relative to GND)			
+5V	-0.3	6.0	V
Input Voltage Range – Digital Inputs	-0.3	3.6V	V
Short circuit to GND (any pin)	---	continuous	
Storage Temperature	-40	+100	ºC
Lead Temperature (10s)	--	+225	ºC
ESD Voltage Rating – Human Body Model test		2000	V

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20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.
Phone: 886-3-666-7799   Fax: 886-3-666-7711
Website: www.wneweb.com

6.2. DC Electrical Characteristics

Operating Conditions: +5V_IN = 5.0V ±10%, T_A=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-2 6-3 AVMD7540-SWA6 DC Electrical Characteristics

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input supply voltage	Driven by an external regulator	4.5		5.5	V
Supply Current – (Note 1)	RESET			10	mA
	RX mode: 1 stereo output I2S		100		mA
CMOS I/O Logic Levels – 3.3V I/O					
Input Voltage Logic Low, V_{IL}	Internal regulator = 3.3V			0.6	V
Input Voltage Logic High, V_{IH}	Internal regulator = 3.3V	2.0			V
Output Voltage Logic Low, V_{OL}	Internal regulator = 3.3V; I_{LOAD}=1mA			0.4	V
Output Voltage Logic High, V_{OH}	Internal regulator = 3.3V; I_{LOAD}=1mA	2.9			V

Note 1: The operating states are defined as:

RESET = AVMD7540-SWA6 is held in reset by holding SM0 low

RX mode: AVMD7540-SWA6 is operating in a link as a client node receiving 1 stereo channel of 16bit, 48kHz audio.

6.3. Electrical Characteristics – RF Receiver

Operating Conditions: +5V_IN = 5.0V ±10%, T_A=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-3 -4 AVMD7540-SWA6 Electrical Characteristics – RF Receiver

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
RF Channel Frequency Range		2412		2462	MHz
Sensitivity (Note 1)	T_A=25ºC		-80		dBm
Max Input Signal (Note 1)			-5		dBm
Spurious RF outputs	2400-2483.5 MHz			-47	dBm
	<2400 MHz			-60	dBm
	>2483.5 MHz			-60	dBm
LO leakage				-47	dBm

Note 1: Sensitivity and max signal level are defined as the onset of 1% BLER Block Error Rate.

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Website: www.wneweb.com

6.4. Electrical Characteristics – RF Transmitter

Operating Conditions: +5V_IN = 5.0V ±10%, T_A=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-5 -5 AVMD7540-SWA6 Electrical Characteristics – RF Transmitter

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
RF Performance					
RF Channel Frequency Range		2412		2462	MHz
Output Power	T_A=25ºC, OFDM signal, 16MHz channel BW		+16		dBm
Harmonics (Note 1)	2nd harmonic			-45	dBm
	3rd harmonic			-45	dBm
Conducted RF Spurious signals	800-1000MHz			-45	dBm
	2000-2390MHz			-45	dBm
	2483.5- 3000MHz; RBW=1MHz			-45	dBm
	3000-4000MHz ; RBW=1MHz				
	4.0-26.5GHz; RBW=1MHz				
Radiated Spurious RF signals	30-88MHz,			34	dBuV/m
	88-216MHz			37	dBuV/m
	216-960MHz			40	dBuV/m
	>960MHz			48	dBuV/m
LO leakage	Relative to power in a 100kHz BW **, after DC offset correction			-20	dBc

Note 1: Measured at TX output power = +16dBm
Note 1: Measured at TX output power = +16dBm

6.5. Electrical Characteristics – RF Channel Frequency

Operating Conditions: +5V_IN = 5.0V ±10%, T_A=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-5 -6 AVMD7540-SWA6 Electrical Characteristics – RF Transmitter

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
RF Performance					
	AM2G system channel 1		2412		MHz
Channel Frequency	AM2G system channel 2		2438		MHz
	AM2G system channel 3		2462		MHz

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Frequency Error	16MHz crystal			+/- 20	ppm

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6.6. Electrical Characteristics – End-to-end Audio Characteristics

Operating Conditions: +5V_IN = 5.0V ±10%, TA=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-6 -7 AVMD7540-SWA6 Electrical Characteristics – End-to-end Audio Characteristics

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
End-to-end SNR	I2S in to I2S out, no interference;				
	16bit / 48kHz mode	96			dB
	24bit / 48kHz mode	120			dB
	16bit / 96kHz mode	97			dB
	24bit / 96kHz mode	120			dB
Latency	48kHz, interleaving level = 0			11	ms
	48kHz, interleaving level = 1			15	ms
	48kHz, interleaving level = 2			19	ms
Bandwidth	+/-0.5dB flatness, 48Khz modes	20		20k	Hz
	+/-0.5dB flatness, 96Khz modes	20		40k	Hz

6.7. Electrical Characteristics – MCLK Characteristics

Operating Conditions: +5V_IN = 5.0V ±10%, TA=0ºC to +50 ºC; RF Chan. Freq. = 2412MHz to 2462MHz. All specifications are referenced to the AVMD7540-SWA6 edge connector pins and RF connectors, unless otherwise specified. Typical specifications at 5.0V and 25 ºC.

Table 6-7 AVMD7540-SWA6 Electrical Characteristics – MCLK Characteristics

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
MCLK frequency	"24MHz" mode (256MHz divide by 10.5)		24.38		MHz
	"12MHz" mode (256MHz divide by 21)		12.19		MHz
MCLK output duty cycle		40		60	%

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20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.
Phone: 886-3-666-7799   Fax: 886-3-666-7711
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7. Package Information

(Fig. 8)

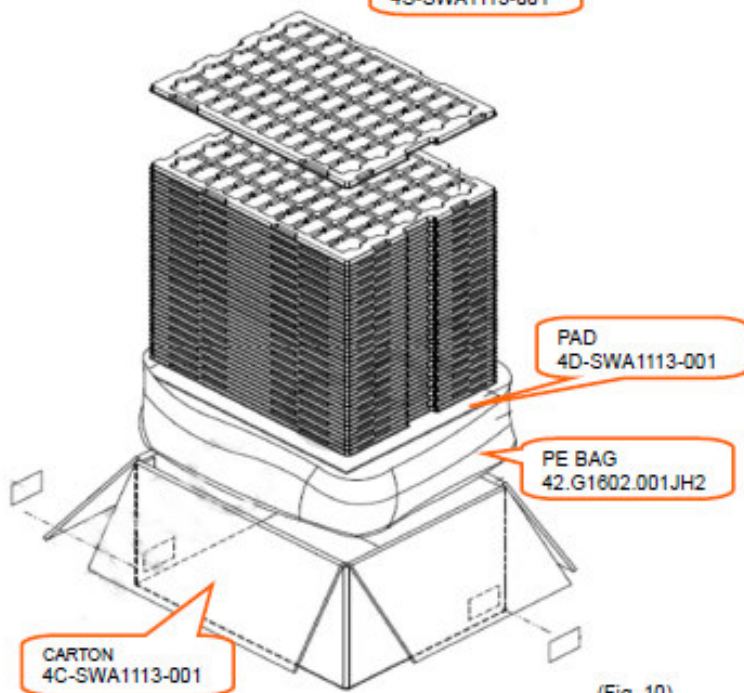TRAY
4S-SWA1113-001

(Fig. 9)

PAD
4D-SWA1113-001

PE BAG
42.G1602.001JH2

CARTON
4C-SWA1113-001

(Fig. 10)

To OEM installer:

1a. FCC ID label on the final system must be labeled with "**Contains FCC ID: NKR-SWA6**" or "**Contains transmitter module FCC ID: NKR-SWA6**".
1b. IC Canada label on the final system must be labeled **with "Contains Module WNC SWA6 IC: 4441A-SWA6"**

2.In the user manual, final system integrator must be ensured that there is no instruction provided in the user manual to install or remove the transmitter module.

3. Transmitter module must be installed and used in strict accordance with the manufacturer is instructions as described in the user documentation that comes with the product. This device complies with the following radio frequency and safety standards.

4. To inherit the modular approval, the antennas for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

The user manual of the final host system must contain the following statement:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.