

## DA14AVDDECT SF01

### General Description

The DA14AVDDECT from Renesas is a member of the wireless module family that operates in the interference-free DECT frequency band (1.9 GHz) and can be used in hosted or embedded Audio, Voice, and Data applications. The module includes all the required radio components, antenna, a low-power audio CODEC (DA7218), and a 32 Mb FLASH memory. The module is intended for users who are familiar with application-level software programming but does not require detailed understanding of the DECT protocol to facilitate rapid design-in cycles. The module can be operated as a stand-alone device or from a host through an API interface.

The module is based on Renesas DA14495 chip that supports DQPSK and D8PSK besides the traditional GFSK. This increases the raw air data rate by up to three times.

The module is available with 1.5 mm pitch BGA solder balls for excellent solderability and sufficient connectivity. The dimensions for the module are 17.0 mm × 26.65 mm.

This document describes the hardware of the DA14AVDDECT module. A separate document details the software and APIs.

### Key Features

- All RF components are integrated, thus no customer tuning is required
- Supported bands include EU-DECT, DECT 6.0 for North America, and Japan DECT (JDECT)
- On-PCB antenna, the module also supports an optional second external antenna
- Integrated RF shield
- Low power operations
- Audio bandwidth from 20 Hz to 20 kHz
- 32-Mbit FLASH, so program memory available for custom software
- Integrated audio ADC/DAC (external audio ADC/DAC supported through GPIO mapping)
- Limited modular approval for EN301-406 (EU-DECT), FCC Part 15 (DECT 6.0), and TELEC (J-DECT)
- Supports NiMH, alkaline, and Li-Ion batteries
- A Voice Data Stack or an Audio Data Stack are available to be downloaded

### Applications (Defined by Software)

- Public Address solution with four microphones
- Tour Guide Systems for up to 1024 listeners
- Conferencing Systems with eight participants
- Wireless Intercom Systems supporting HD Voice
- Wireless Stereo Headphones and Headsets
- Wireless Low Latency Microphones

# System Diagram

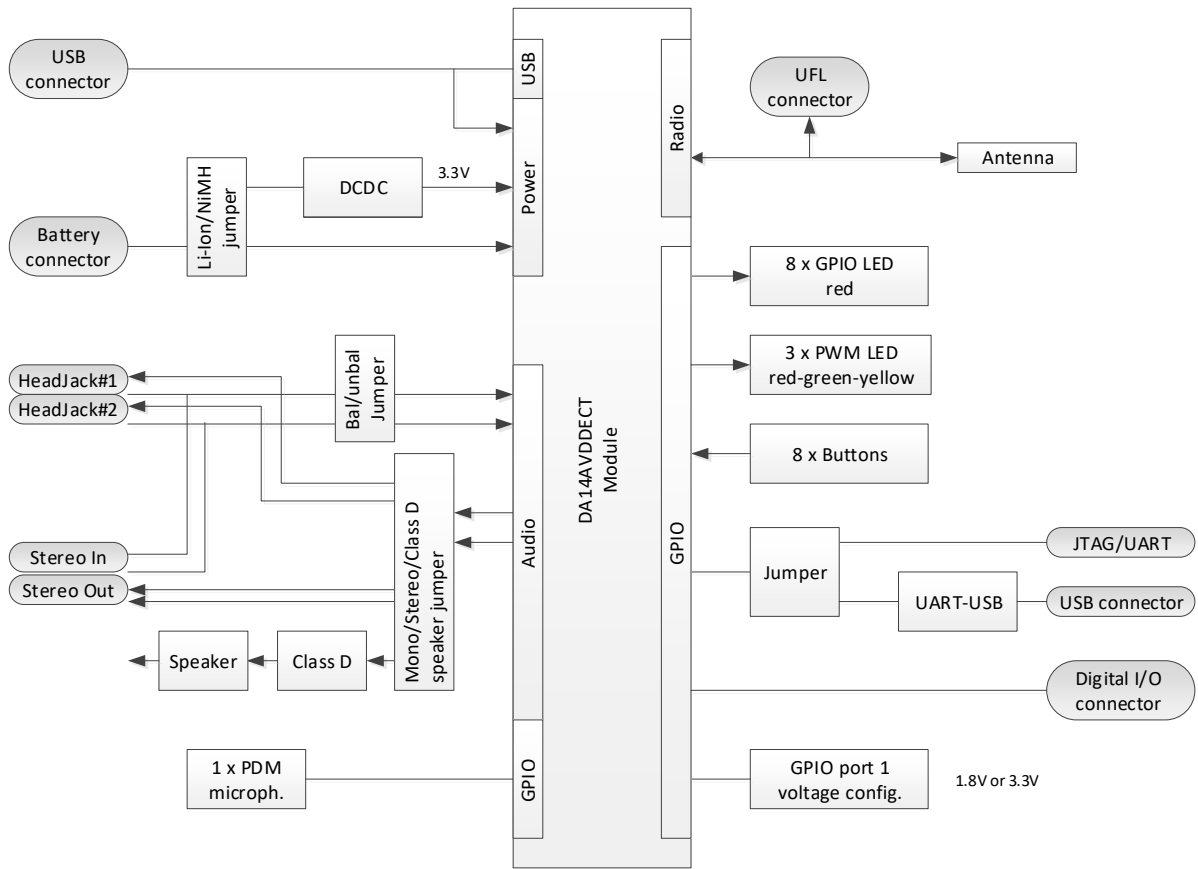


Figure 1. System diagram

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## 1. References

- [1] DA14495, Datasheet, Renesas Electronics.
- [2] DA7218, Datasheet, Renesas Electronics.
- [3] UM-D-011, DA14AVDDECT Production Programming and Configuration Manual, User Manual, Renesas Electronics.
- [4] AN-D-236, DA14AVDDECT External Antenna Design, Application Note, Renesas Electronics.
- [5] DA14AVDDECT CVM software.
- [6] DA14AVDDECT WAM software.
- [7] UM-D-012, DA14AVDDECT Software Developer's Guide, User Manual, Renesas Electronics.

## 2. Block Diagram

The DA14AVDDECT module is built around Renesas DA14495 DECT chip. The module integrates RF components (that is, baluns, switches, RFPA, and crystal) with an integrated antenna. It also allows an additional external antenna to be connected to support antenna diversity.

A low-power audio CODEC from Renesas (DA7218) is integrated to support analog audio applications. A 32-Mb Flash is integrated into custom software.

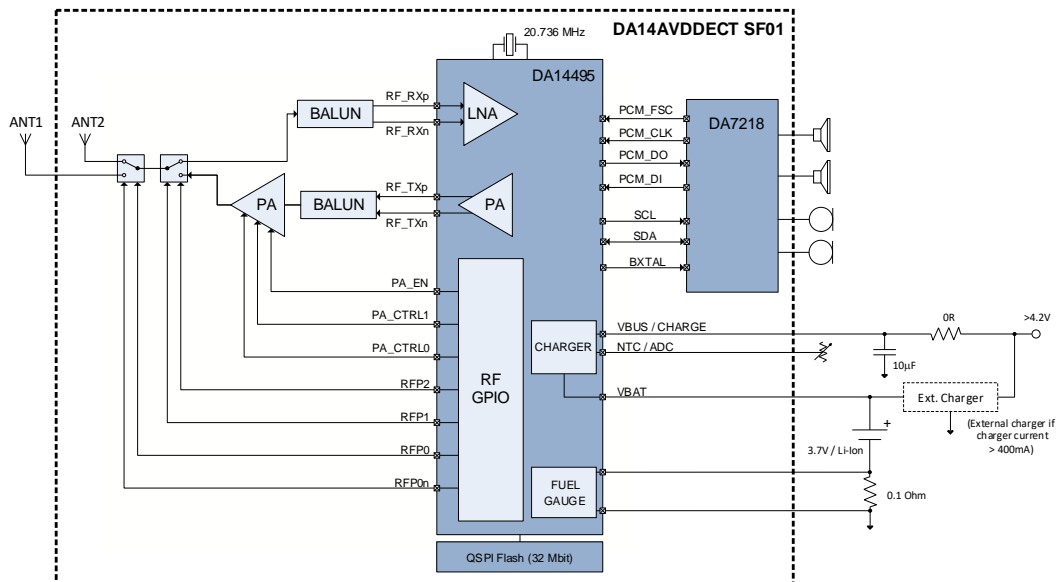


Figure 2. Block diagram

The block diagram in Figure 2 demonstrates the stereo audio capability. The hardware of the DA14AVDDECT supports these connections, but the current software implementations only support mono audio.

### 3. Pinout

With [Figure 3](#) the pin functions can easily be identified. See [Section 6](#) for an accurate mechanical representation.

	1	2	3	4	5	6	7	8	9	10	11
A	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND
B	NC	GND	GND	GND	GND	GND	GND	GND	GND	GND	+VRF_PA_2
C	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	+VRF_PA_2
D	ANT1	GND	GND	GND	GND	GND	GND	GND	GND	P1.8	GND
E	GND	GND	GND	GND	GND	GND	GND	+VRF_PA_1	P2.3	P1.7	+VSUPPLY
F	GND	GND	GND	GND	GND	GND	GND	P2.0	P2.6 / LED0	P2.7 / LED1	P1.4
G	GND	GND	GND	GND	GND	RST	GND	P2.2	NC	P1.6	P2.1
H	GND	NC	GND	+1.8V	P0.14 / NTC	P0.13	NC	P2.8 / LED2	P1.5	P1.3	P1.1
J	GND	NC	GND	GND	SOCP	NC	P0.0	P0.10 / I2C-CLK	P1.11	P1.2	P1.10
K	MICBIAS1	P0.12	+3.3V	P0.15 PON	VBAT	SOCP	P0.1	P0.4	P1.9	P1.0	VDDIO1
L	CODEC ADDRESS	P2.5 / I2C-DATA	GND	NC	VBAT	P0.3	P0.2	SWCLK	P0.6	P0.7	P1.12
M	MIC2_P	GND	HPLDET	NC	HPR	P0.11 (BXTAL)	USBN	USBP	SWDIO	NC	P0.5
N	MIC2_N	MIC1_P	MIC1_N	MICBIAS2	GND	HPL	+VDCDC	VBUS / CHARGE	GND	NC	GND

Figure 3. DA14AVDDECT BGA pinout diagram (top view)

**NOTE**

On the bottom (ball) side of the module, at the end of the printed antenna pattern, there is a ball "T1" (see the lower left corner of [Figure 4](#)). This is for Renesas production test purposes only and serves no customer application use. The customer application shall not have a solder connection to T1.

Table 1. Pin description

Pin No.	Pin name	Type (Table 2)	Drive (mA)	Reset state	Description
<b>RF</b>					
D1	ANT1	AIO			RF connection ANT1 This pin is used together with the integrated printed antenna to connect an external antenna to support antenna diversity.
T1	ANT_TEST	AIO			The PCB of a customer application shall not have a solder connection to T1.
<b>Power</b>					
E8	+VRF_PA_1	PWR			Input supply voltage of RFPA bias stage
B11, C11	+VRF_PA_2	PWR			Input supply voltage of RFPA power stage
H4	+1.8V	PWR			Output supply voltage 1.8 V It can be used to configure the GPIO voltage of bank 1 (VDDIO1), for example. <b>Note:</b> GPIO voltage of bank 0 and 2 is always supplied from 1.8 V.
K3	+3.3V	PWR			Output supply voltage 3.3 V It can be used to configure the GPIO voltage of bank 1 (VDDIO1), for example.
K5, L5	VBAT	PWR			Main input supply voltage
K11	VDDIO	PWR			Input supply voltage of GPIO bank 1
N7	+VDCDC	PWR			Output supply voltage of internal DCDC converter It can be used as an input when the internal DCDC is disabled.
N8	VBUS/CHARGE	PWR			Input supply voltage of the battery charger and/or the USB
E11	VSUPPLY	PWR			Output voltage of DA14495
<b>Audio</b>					
K1	MICBIAS1	AO			Microphone bias output 1 (requires 1 $\mu$ F decoupling)
N2	MIC1_P	AI			Differential analog microphone 1 input (Pos)
N3	MIC1_N	AI			Differential analog microphone 1 input (Neg)
N4	MICBIAS2	AO			Microphone bias output 2 (requires 1 $\mu$ F decoupling)
M1	MIC2_P	AI			Differential analog microphone 2 input (Pos)
N1	MIC2_N	AI			Differential analog microphone 2 input (Neg)
M3	HPLDET	AI			Current source for headphone detection
M5	HPR	AO			Single-ended headphone output (Right)
N6	HPL	AO			Single-ended headphone output (Left)
L1	CODEC ADDRESS	DI			Connecting this pin to GND selects the I2C slave address 0x1A; connecting this pin to pin H4 selects the I2C slave address 0x1B.
<b>USB</b>					

Pin No.	Pin name	Type (Table 2)	Drive (mA)	Reset state	Description
M7	USBN	A11		Hi-Z	INPUT/OUTPUT. USB-. Typical HS output impedance is 45 Ω.
M8	USBP	A11		Hi-Z	INPUT/OUTPUT. USB+. Typical HS output impedance is 45 Ω.
<b>JTAG</b>					
L8	SWCLK	DI-BP		I_PD	INPUT. Arm debug interface clock.
M9	SWDIO	DIO-BP	4/8	I_PU	INPUT/OUTPUT. Arm debug interface data input/output.
<b>Special Functions</b>					
G6	RSTn	A5		25 kΩ pull-up resistor connected to VDD1V2	INPUT/OPEN DRAIN OUTPUT with internal pull-up. Reset signal (active LOW). No external capacitor required. If the internal VDD1V2 drops below 1.06 V, this pin is pulled low. An external device may not drive this pin higher than VDD1V2 (1.2V).
J5	SOCN	A1		I	INPUT. Battery fuel gauge reference ground. Connect as star point. If it is not used, connect it to GND to prevent a false power-on trigger (NEW_BAT) due to a floating pin.
K6	SOCP	A1		I	INPUT. Battery fuel gauge positive input. If it is not used, connect it to VSS to prevent a false power-on trigger (NEW_BAT) due to a floating pin.
K4	P0.15/PON	DI	4/8	I_PD	INPUT with a selectable pull-up/down resistor. <b>Note:</b> P0.15 cannot be used as output. INPUT. Device Power-on. It can be directly connected to VBAT (max 5 V). If PON has a fixed connection to VBAT, the PD resistor can be disabled to save power.
F9	P2.6/LED0	DIO-BP DO-BP	4/8/16	I_PU	INPUT/OUTPUT with a selectable pull-up/down resistor. OUTPUT: Back drive protected pad for LED0 up to VSUPPLY. A series of resistors is required for LED operation.
F10	P2.7/LED1	DIO-BP DO-BP	4/8/16	I_PU	INPUT/OUTPUT with a selectable pull-up/down resistor. OUTPUT: Back drive protected pad for LED1 up to VSUPPLY. A series of resistors is required for LED operation.
H8	P2.8/LED2	DIO-BP DO-BP	4/8/16	I_PU	INPUT/OUTPUT with a selectable pull-up/down resistor. OUTPUT: Back drive protected pad for LED2 up to VSUPPLY. A series of resistors is required for LED operation.



Pin No.	Pin name	Type (Table 2)	Drive (mA)	Reset state	Description
H5	P0.14/NTC	DIO-BP AI AI	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor. ANALOG INPUT: Analog to Digital Converter (ADC) input 0. ANALOG INPUT: Li-Ion/Li_Po NTC protection which is used to automatically switch off the charger circuit if this input goes beyond the specified voltage ranges. <b>Note:</b> Only GPIO port (I/O), digital input, and the analog function are available; no peripheral outputs are available.
L2	P2.5/I2C_DATA	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
J8	P0.10/I2C_CLK	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
M6	P0.11/BXTAL	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor. OUTPUT: PLL Codec output (12.288 MHz/24.567 MHz). Supplied from VDDIO_BXTAL.
<b>General Purpose IO</b>					
J7	P0.0	DIO	4/8	I_PU	INPUT/OUTPUT with a selectable pull-up/down resistor. If 0 is on the rising edge of the RSTn pin, boot the module from UART. Assign the module as UTX if the module is booted from UART
K7	P0.1	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor. Assign the module as URX if the module is booted from UART.
L7	P0.2	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor. If 1 is on the rising edge of the RSTn pin, the Booter waits in an endless loop for debugging purposes.
L6	P0.3	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
K8	P0.4	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
M11	P0.5	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
L9	P0.6	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
L10	P0.7	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
K2	P0.12	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
H6	P0.13	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.

Pin No.	Pin name	Type (Table 2)	Drive (mA)	Reset state	Description
K10	P1.0	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
H11	P1.1	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
J10	P1.2	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
H10	P1.3	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
F11	P1.4	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
H9	P1.5	DIO	4/8/12/16	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
G10	P1.6	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
E10	P1.7	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
D10	P1.8	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
K9	P1.9	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
J11	P1.10	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
J9	P1.11	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
L11	P1.12	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
F8	P2.0	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
G11	P2.1	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down pull-up/down resistor.
G8	P2.2	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down pull-up/down resistor.
E9	P2.3	DIO	4/8	I_PD	INPUT/OUTPUT with a selectable pull-up/down resistor.
<b>Ground and No Connects</b>					
A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, D2, D3, D4, D5, D6, D7, D8, D9, D11, E1, E2, E3, E4, E5, E6, E7, F1,	GND	GND			Analog and digital ground. They are connected on a solid ground plane.

Pin No.	Pin name	Type (Table 2)	Drive (mA)	Reset state	Description
F2, F3, F4, F5, F6, F7, G1, G2, G3, G4, G5, G7, H1, H3, J1, J3, J4, L3, M2, N5, N9, N11					
G9, H7, J6, M4, M10, N10	NC	NC			Not connected. No package ball/pin available on the package.
H2, J2, L4	Keep out	NC			Not connected, but package balls/pins are available: implement keep-out on application PCBs to ensure balls/pins are not connected to anything or close to any noise signals.

Table 2. Pin type definition

Pin type	Description	Pin type	Description
DI	Digital input	AI	Analog input
DO	Digital output	AO	Analog output
DIO	Digital input/output	AIO	Analog input/output
DIOD	Digital input/output open drain	BP	Back drive protection
PU	Pull-up resistor (fixed)	SPU	Switchable pull-up resistor
PD	Pull-down resistor (fixed)	SPD	Switchable pull-down resistor
PWR	Power	GND	Ground

## 4. Characteristics

### 4.1 Absolute Maximum Ratings

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, so functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification are not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

Table 3. Absolute maximum ratings

Parameter	Description	Conditions	Min	Max	Unit
VESD	Maximum ESD voltage	HBM		2	kV
VBAT	Battery voltage			4.6	V
VBUS	BUS voltage			6.5	V

### 4.2 Recommended Operating Conditions

Table 4. Recommended operating conditions

Parameter	Description	Conditions	Min	Type	Max	Unit
V <sub>BAT</sub>	Battery supply voltage	Limited by the supply voltage requirements of the SKY77762 power amplifier module from SYKWORKS	1.9		4.2	V
V <sub>BUS</sub>	USB voltage		4.2		5.75	V
+V <sub>RF_PA_1</sub>	Bias supply SKY77762	< 10 mA current draw	3.0		4.2	V
+V <sub>RF_PA_2</sub>	Power supply SKY77762	Up to ~350 mA current draw	1.9	3.3	3.6	V
T <sub>A</sub>	Ambient operating temperature range		-20		+60	°C
V <sub>SUPPLY</sub>	Output voltage of DA14495		1.9	3.45	3.6	V
V <sub>DCDC</sub>	Output voltage of the DA14495 DCDC converter When the DCDC is disabled, the same pin can be connected to an external supply, overriding the internal DCDC converter.		1.4		1.89	V

## 4.3 Electrical Characteristics

**Table 5. Digital I/O characteristics**

Parameter	Description	Conditions	Min	Type	Max	Unit
V <sub>DDIO</sub>	Supply voltage of IO band		1.6		3.45	V
V <sub>PIN_NEG</sub>	Negative voltage on IO pin		GND - 0.3			V
V <sub>PIN_POS</sub>	Positive voltage on IO pin				V <sub>DDIO</sub> + 0.2	V
V <sub>PIN_PON</sub>	Voltage on pin P0.15/PON				5	V
V <sub>PIN_USB</sub>	Voltage on pins USBp and USBn				3.6	V
V <sub>IH</sub>	High level input voltage		0.7 × V <sub>DDIO</sub>			V
V <sub>IL</sub>	Low level input voltage				0.3 × V <sub>DDIO</sub>	V
V <sub>DDIO0_2</sub>	IO voltage bank0/2			1.8		V
V <sub>DDIO1</sub>	IO voltage bank 1	User programmable by connecting the 3V3 (pin K3) or 1V8 (pin H4) from the module to V <sub>DDIO1</sub>		1.8 3.3		V

**Table 6. Radio characteristics**

Parameter	Description	Conditions	Min	Type	Max	Unit
F <sub>operating</sub>	Frequency bands supported	EU-DECT, US-DECT, and J-DECT (K-DECT is not supported)				
R <sub>Xsense</sub>	Receiver sensitivity	GFSK, EU-DECT ch5		-92		dBm
P <sub>o</sub>	Transmitted output power	GFSK, EU-DECT ch5		+22		dBm
P <sub>spur</sub>	Spurious emissions	ETSI/FCC compliant				
T <sub>XACPR1</sub>	Transmitter adjacent channel power ratio M = 1	P <sub>o</sub> = +16 dBm, π/4 DQPSK			-33	dBc
T <sub>XACPR3</sub>	Transmitter adjacent channel power ratio M = 3	P <sub>o</sub> = +16 dBm, π/4 DQPSK			-66	dBc
T <sub>XEVM</sub>	Transmitter error vector magnitude	P <sub>o</sub> = +16 dBm, π/4 DQPSK			6	%

**Table 7. Supply currents (Tour Guide mode)**

Parameter	Description	Conditions (Note 1)	Min	Type	Max	Unit
I <sub>avg_TG_stby</sub>	Standby supply current (Tour Guide mode)	FP (TX); HPM		23		mA
		FP (TX); HPM/U		20		mA
		PP (RX); HPM		8		mA
I <sub>avg_TG_talk</sub>	Talk mode supply current (Tour Guide mode)	FP (TX); LPM		53		mA
		FP (TX); HPM		71		mA
		FP (TX); HPM; Question call		91		mA
		FP (TX); HPM/U		61		mA
		FP (TX); HPM/U; Question call		76		mA
		PP (RX); LPM; RX only		31		mA

Parameter	Description	Conditions (Note 1)	Min	Type	Max	Unit
		PP (RX); LPM; Return channel		38		mA
		PP (RX); HPM; RX only		42		mA
		PP (RX); HPM; Return channel		49		mA
		PP (RX); HPM/U; RX only		37		mA
		PP (RX); HPM/U; Return channel		46		mA

**Note 1** VBAT, +VRF\_PA\_1 and +VRF\_PA\_2 pins connected to +3.3 V supply; I<sub>avg</sub>: current drawn from the +3.3 V supply. Software configuration by default example application. Standby mode: no PP locked to FP.

**Table 8. Supply currents (Public Address mode)**

Parameter	Description	Conditions (Note 1)	Min	Type	Max	Unit
I <sub>avg_PA_stby</sub>	Standby supply current (Public Address mode)	FP (RX); HPM		26		mA
		FP (RX); HPM/U		20		mA
		PP (TX); HPM		8		mA
I <sub>avg_PA_talk</sub>	Talk mode supply current (Public Address mode)	FP (RX); LPM; 1PP (TX)		35		mA
		FP (RX); LPM; 2PPs (TX)		42		mA
		FP (RX); LPM; 3PPs (TX)		50		mA
		FP (RX); LPM; 4PPs (TX)		56		mA
		FP (RX); HPM; 1PP (TX)		38		mA
		FP (RX); HPM; 2PPs (TX)		48		mA
		FP (RX); HPM; 3PPs (TX)		56		mA
		FP (RX); HPM; 4PPs (TX)		63		mA
		FP (RX); HPM/U; 1PP (TX)		34		mA
		FP (RX); HPM/U; 2PPs (TX)		43		mA
		FP (RX); HPM/U; 3PPs (TX)		51		mA
		FP (RX); HPM/U; 4PPs (TX)		60		mA
		PP (TX); LPM		32		mA
		PP (TX); HPM		44		mA
PP (TX); HPM/U		38		mA		

**Table 9. Supply currents (Voice Conference mode)**

Parameter	Description	Conditions (Note 1)	Min	Type	Max	Unit
I <sub>avg_CVM_stby</sub>	Standby supply current (Voice Conference mode)	FP; HPM		16		mA
		PP; HPM		8		mA
I <sub>avg_CVM_talk</sub>	Talk mode supply current (Voice Conference mode)	FP; HPM; 1PP		39		mA
		FP; HPM; 2PPs		47		mA
		FP; HPM; 3PPs		58		mA
		FP; HPM; 4PPs		68		mA
		FP; HPM; 5PPs		76		mA
		FP; HPM; 6PPs		86		mA
		FP; HPM; 7PPs		95		mA
		FP; HPM; 8PPs		104		mA
		FP; HPM/U; 1PP		37		mA

Parameter	Description	Conditions (Note 1)	Min	Type	Max	Unit
		FP; HPM/U; 2PPs		45		mA
		FP; HPM/U; 3PPs		54		mA
		FP; HPM/U; 4PPs		62		mA
		FP; HPM/U; 5PPs		69		mA
		FP; HPM/U; 6PPs		77		mA
		FP; HPM/U; 7PPs		85		mA
		FP; HPM/U; 8PPs		91		mA
		PP; HPM		31		mA

## 5. Functional Description

The DA14AVDDECT module is a hardware platform capable of serving multiple functions. The functions fall into two categories, Cordless Voice Module (CVM) and Wireless Audio Module (WAM), and they are defined in the software. These two functions of the DA14AVDDECT are described in their separate CVM and WAM software documents. Consult with your Renesas representative for further details.

Also note that the module is supplied without any software pre-loaded in Flash. See Ref. [3] for programming and configuring the module.



## 6. Package Information

### 6.1 Package Outline Drawing

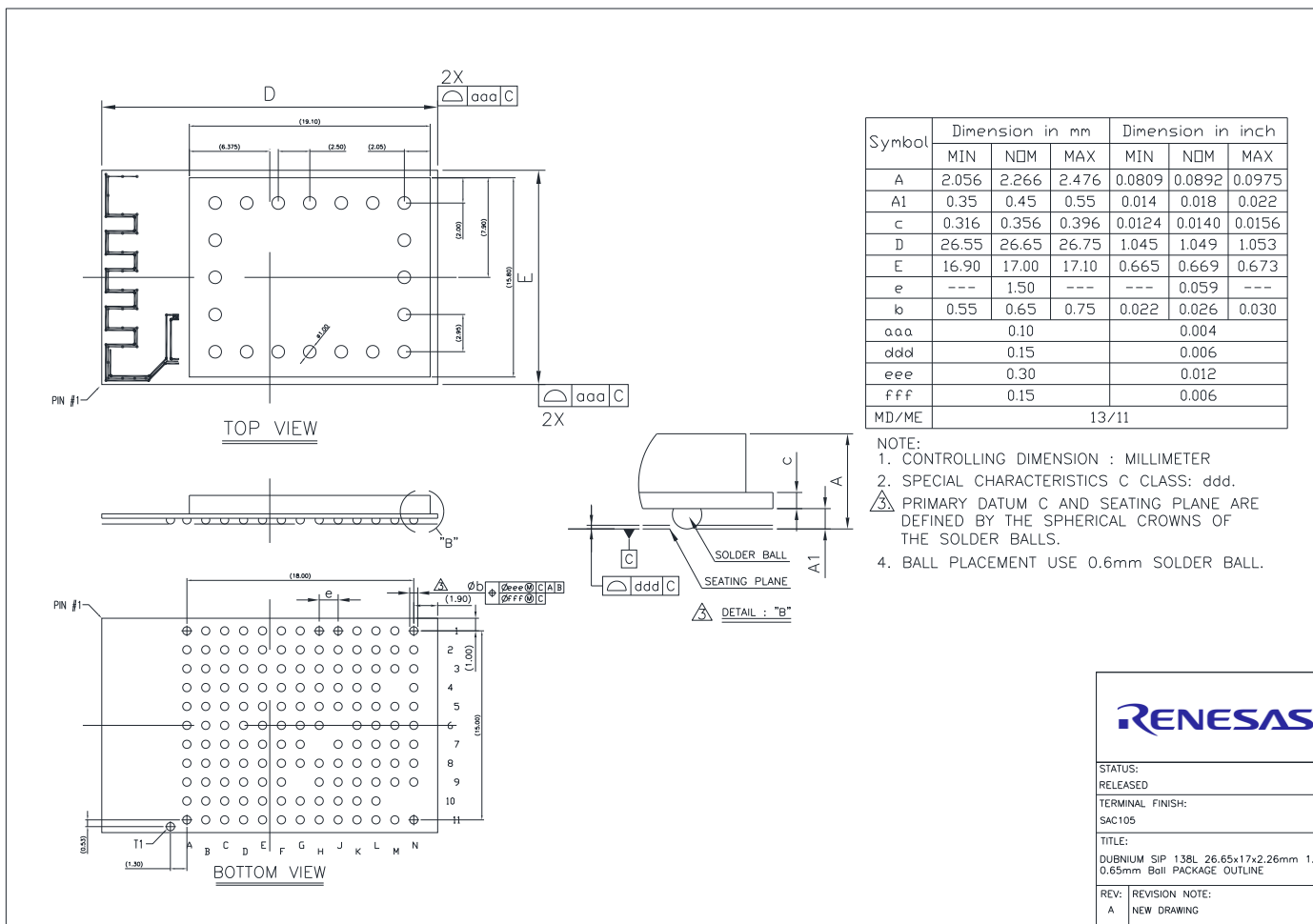


Figure 4. DA14AVDDECT BGA package outline drawing

## 6.2 Moisture Sensitivity Level

The Moisture Sensitivity Level (MSL) is an indicator for the maximum allowable time period (floor lifetime) in which a moisture sensitive plastic device, once removed from the dry bag, can be exposed to an environment with a specified maximum temperature and a maximum relative humidity before the solder reflow process. The MSL classification is defined in [Table 10](#).

For detailed information on MSL levels see the IPC/JEDEC standard J-STD-020, which can be downloaded from <http://www.jedec.org>.

The DA14AVDDECT is qualified for MSL 3.

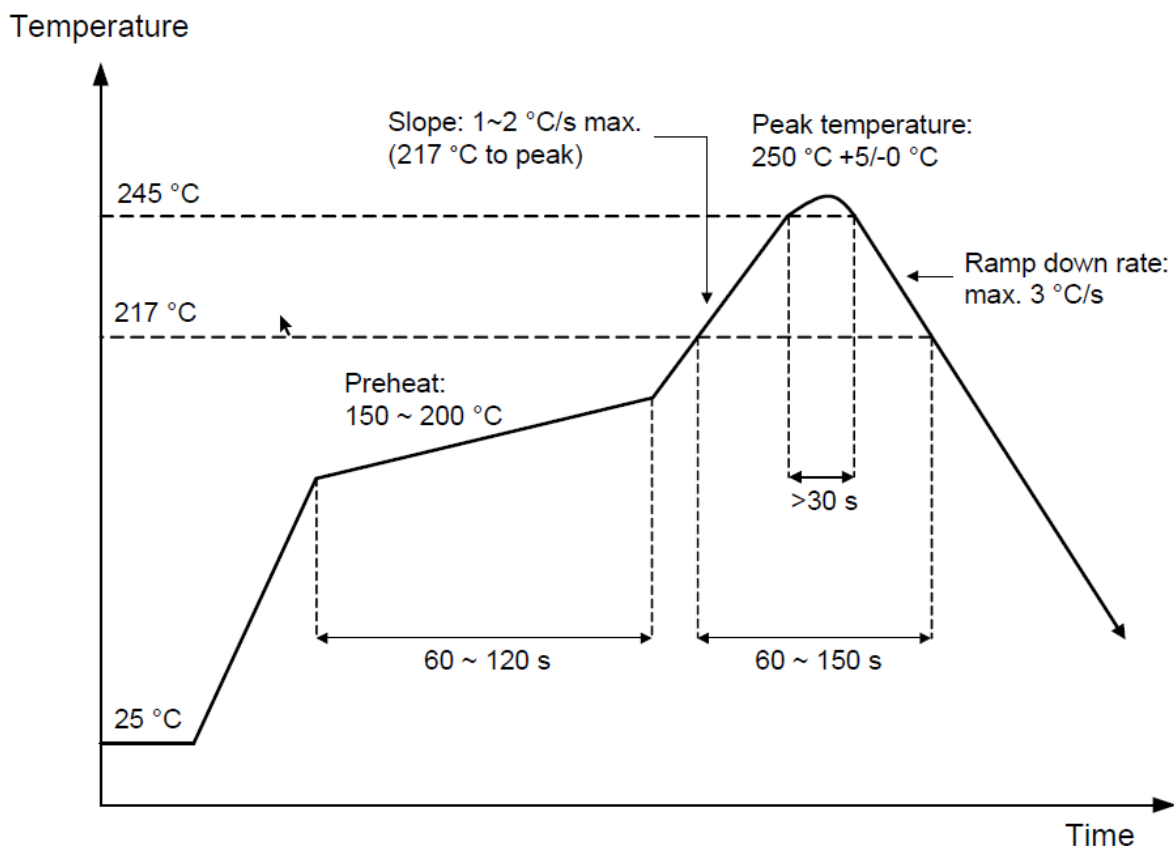
**Table 10. MSL classification**

MSL level	Floor lifetime	Conditions
MSL 4	72 hours	30 °C / 60% RH
MSL 3	168 hours	30 °C / 60% RH
MSL 2A	4 weeks	30 °C / 60% RH
MSL 2	1 year	30 °C / 60% RH
MSL 1	Unlimited	30 °C / 85% RH

## 6.3 Soldering Information

The DA14AVDDECT should be soldered using a lead-free reflow soldering profile as shown in [Figure 5](#). Adjustments to the profile may be necessary, depending on process requirements.

The recommended solder paste for lead-free soldering is Sn 96.5%, Ag 3.0%, and Cu 0.5%.



**Figure 5. Reflow profile (lead-free)**

### 6.4 Packaging

The DA14AVDDECT is packaged in trays.

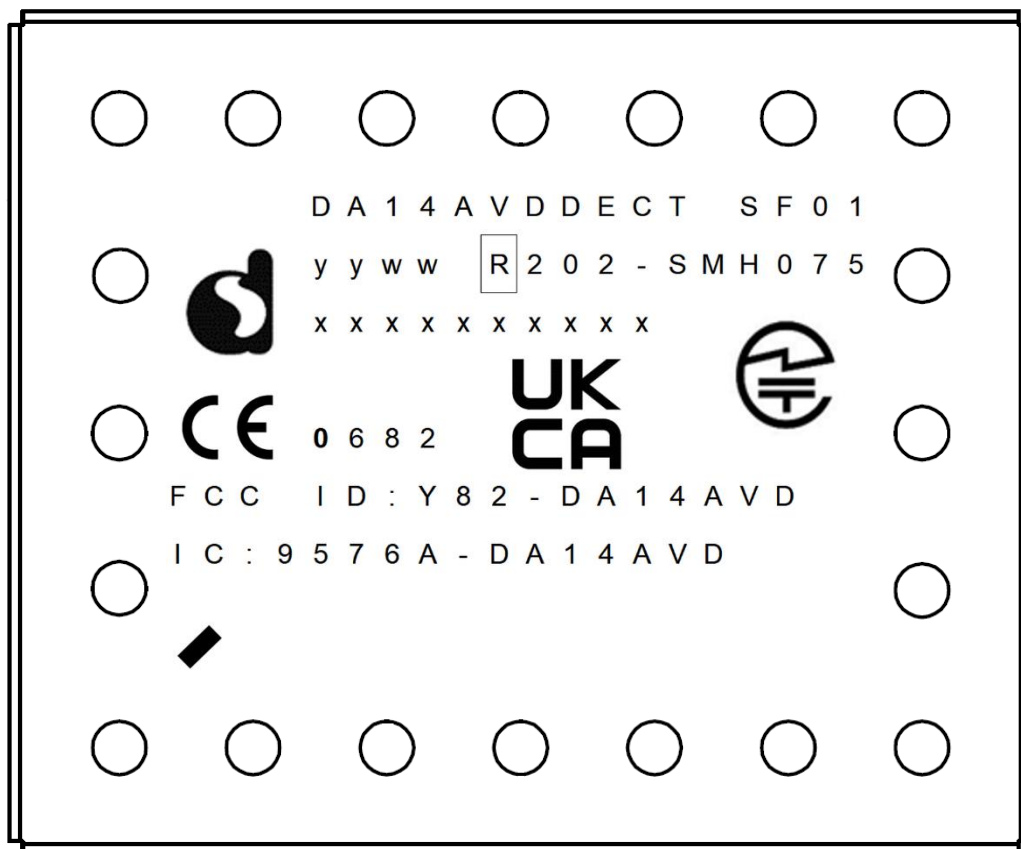


Figure 6. DA14AVDDECT package marking

Table 11. DA14AVDDECT package marking table

Row/Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.					Manufacturer Part Number															
2.	Dialog Logo				Date Code				TELEC License Number											
3.			Assembly Lot Number												TELEC mark					
4.	CE mark								UKCA mark											
5.			Qualification Code																	
6.	RF License (FCC)																			
7.	RF License (Industry Canada)																			
8.	Pin1 Orientation																			

## 7. Ordering Information

The ordering number consists of the part number followed by a suffix indicating the packing method. For details and availability, consult your Renesas [local sales representative](#).

**Table 12. Ordering information**

Part number	Package	Size module (mm)	Shipment form
DA14AVDDECT SF01	PCB Module	17.0 mm × 26.65 mm	Tray

## 8. Application Information

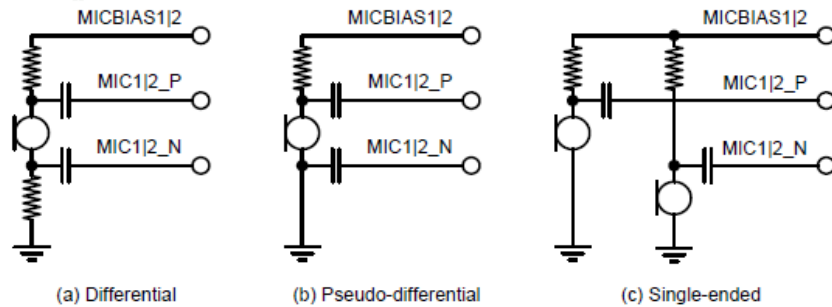
As mentioned in Section 5, the DA14AVDDECT functionality is defined in software and the software specifics are detailed in separate documents. The DA14AVDDECT can be operated stand-alone or controlled from a host application through the API interface. The on-board Flash memory can be used to store the custom code.

The following points highlight some hardware-specific aspects of application implementation:

- Antennas:
  - The module includes an integrated printed antenna (ANT2).
  - Optionally, an additional external antenna (ANT1) can be connected to support antenna diversity.
    - For an optimal wireless performance, it is recommended to always use two antennas, that is, the internal antenna combined with an external antenna.
  - A special build option may be ordered with a special ordering code that disconnects ANT2 from the internal printed antenna and allows two external antennas to be used.
- Supply voltage of RFPA:
  - +VRF\_PA\_1 and +VRF\_PA\_2 need to be connected to external supply voltages.
  - To be able to leverage the Limited Modular Approval certification (for more information see Ref. [4]), the supply circuit should be copied from the reference application used for certification. If it is desired to deviate from the reference application, note the following, and it may not be possible to leverage the Limited Modular Approval any more:
    - +VRF\_PA\_1 requires a minimum input voltage of 3.0 V (current draw 10 mA), so an external DCDC boost converter is required if two AA applications are targeted.
    - Typically, +VRF\_PA\_2 is connected to an external 3.3 V supply voltage (up to 350 mA current draw depending on the RF TX output power levels). An optimal battery efficiency is obtained if +VRF\_PA\_2 is sourced from a DCDC power supply adjusted within 0.5 V to 3.5 V based on the target output power levels.
- The DA14AVDDECT module includes an integrated battery charger and the associated power dissipation increases the module's temperature. Make sure that the chip temperature does not exceed its operational temperature range, especially when other functions are also enabled. Since the module includes an on-board temperature sensor to facilitate chip temperature detection, how to protect the chip from overheating needs to be implemented in software and is not described in further detail in this document.
- The DA14AVDDECT module includes an integrated audio CODEC. To support an external audio CODEC, map the GPIOs accordingly. It is implemented in software and is not described in further detail in this document.
- An external protection IC may be required to protect VBUS from supply circuits with possible high overshoot.

## 8.1 Audio Connections

Analog microphones can be connected as shown in [Figure 7](#).



**Figure 7. Connection of analog microphones**

The bias resistor value shall be selected depending on the microphone requirements and MICBIAS1/2 must be decoupled with 1  $\mu$ F capacitors.

The DA14AVDDECT module can support headphone detection. Document UM-D-012 (Ref. [\[7\]](#)) explains how to control this feature in the software. Contact your Renesas representative for further details.

## 9. Layout Guidelines

The module pinout of DA14AVDDECT has been specifically designed to accommodate easy integration with the PCBs of customer applications without having to adding expensive PCB components to increase the cost due to, for example, blind vias or small line/space dimensions.

All standard practice layout rules and guidelines apply. Additional special care may be paid to the antenna and USB areas:

- The application PCB may not extend underneath the antenna area (see [Figure 8](#)).
- Signals from the application PCB containing high harmonic content (for example, clock signals or memory buses) must be kept away from the antenna.
- No metal objects should be placed in the vicinity of the antenna (see [Figure 8](#)).
- The USB data lines should be routed with 90  $\Omega$  differential impedance lines and the line lengths must match.
- Appropriate trace width and number of vias should be used for all power supply paths.
- A common ground plane should be used to allow proper electrical and thermal performances.
- Noise-sensitive analog signals, such as feedback lines or clock connections, should be kept away from the traces carrying pulsed analog or digital signals. This can be achieved by separation (distance) or by shielding the sensitive signals with quiet signals or ground traces.
- Decoupling capacitors should be X5R ceramics and should be placed as near to the module as possible.

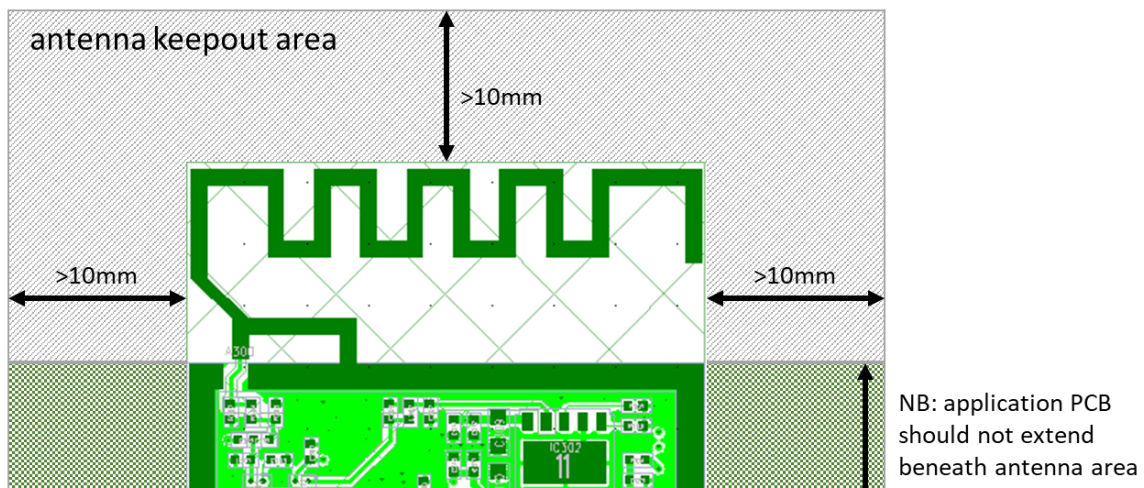


Figure 8. Keep-out areas

It is also advised to use the hardware layout of the DA14AVDDECT evaluation kit as a guideline for customer products. This hardware was used during the certification process and should be regarded as a reference.

See Ref. [4] for more information on the Limited Modular Approval certification and how it can be used, so that no new radio certification needs to be obtained for the end customer products.

## Revision History

Revision	Date	Description
3.0	Nov 27, 2024	Updated Table 1, Table 6, Section 8.1
2.4	Oct 27, 2022	TW editorial plus subject matter review
2.3	Dec 31, 2021	Updated logo, disclaimer, copyright
2.2	July 30, 2021	Updated information on antennas in Section 8
2.1	June 2, 2020	Added supply current tables
2.0	May 14, 2020	Preliminary datasheet
1.9	Sept 18, 2019	Added 'P2.5' to I2C-DATA pin name
1.8	Sept 9, 2019	Added reflow profile Changed pin name I2C-DATA Revised H2/J2 in figure 3 to correspond with table 1 Updated figure 9 to the latest EVK schematic snapshot
1.7	Aug 13, 2019	Added text at LMA section Corrected pin L4 in the pin diagram (1.6 was erroneously reverted to GND), also corrected some pin naming typos Added wording about SW supporting only mono whereas the HW supports stereo
1.6	Aug 8, 2019	Updated pin diagram and table (E11 = Vsupply and others) Corrected B1 and D1 pin descriptions
1.5	June 6, 2019	Changed pin L4 to NC, added comment about pin T1
1.4	Mar 19, 2019	Updated POD
1.3	Mar 7, 2019	Added keepout area drawing in ch9, changed pins H2, J2 to NC
1.2	Feb 20, 2019	Updated package outline drawing; minor cosmetic edits
1.1	Nov 26, 2018	Added package outline drawing
1.0	Oct 31, 2018	First version of target datasheet



**Status Definitions**

Revision	Datasheet Status	Product Status	Definition
1.<n>	Target	Development	This datasheet contains the design specifications for product development. Specifications may be changed in any manner without notice.
2.<n>	Preliminary	Qualification	This datasheet contains the specifications and preliminary characterization data for products in pre-production. Specifications may be changed at any time without notice in order to improve the design.
3.<n>	Final	Production	This datasheet contains the final specifications for products in volume production. The specifications may be changed at any time in order to improve the design, manufacturing and supply. Major specification changes are communicated via Customer Product Notifications. Datasheet changes are communicated via <a href="http://www.renesas.com">www.renesas.com</a> .

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