November 29, 2024

FCC ID: HYQDNNS125

To whom it may concern,

We, UL Japan, Inc, hereby declare that Cockpit Control Unit, model: DNNS125 (FCC ID: HYQDNNS125) of DENSO CORPORATION is exempt from RF exposure SAR evaluation because the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula according to the Code of Federal Regulation title 47 section 1.1307(b)(3)(i)(B). This method is used at separation distances *d* (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive) for single RF sources. P_{th} is given by:

$$P_{th}\ (\mathrm{mW}) = \begin{cases} ERP_{20\ \mathrm{cm}}\ (d\ /\ 20\ \mathrm{cm})^{x} & d \leq 20\ \mathrm{cm} \\ ERP_{20\ \mathrm{cm}} & 20\ \mathrm{cm}\ <\ d\ \leq\ 40\ \mathrm{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ \mathrm{cm}}\sqrt{f}}\right) \text{and } f \text{ is in GHz}$$

$$ERP_{20\ \mathrm{cm}}\ (\mathrm{mW}) = \begin{cases} 2040f & 0.3\ \mathrm{GHz} \leq f < 1.5\ \mathrm{GHz} \\ 3060 & 1.5\ \mathrm{GHz} \leq f \leq 6\ \mathrm{GHz} \end{cases}$$

When the minimum separation distance is shorter than 0.5 cm, 0.5 cm is applied.

The SAR evaluation exemption threshold is calculated as below.

[WLAN 2.4 GHz band part]

Pth (mW)	3060
f (GHz)	2.462
ERP $_{20\ \mathrm{cm}}$ (mW)	3060
d (cm)	20.0

Conducted Power	(dBm)	16.00
	(mW)	39.81
Antenna Gain (dBi)		1.78
EIRP (dBm)		17.78
ERP	(dBm)	15.64
	(mW)	36.64

The Maximum time-averaged power or ERP whichever greater is 39.9 mW.
(Rounded up to two decimals place)

[Bluetooth (BR / EDR) part]

Pth (mW)	3060
f (GHz)	2.48
$ERP_{20\ cm}$ (mW)	3060
d (cm)	20.0

Conducted Power	(dBm)	0.30
	(mW)	1.07
Antenna Gain (dBi)		1.83
EIRP (dBm)		2.13
ERP	(dBm)	-0.01
	(mW)	1.00

The Maximum time-averaged power or ERP whichever greater is 1.1 mW.
(Rounded up to two decimals place)

[WLAN 5 GHz band part]

Pth (mW)	3060
f (GHz)	5.825
$ERP_{20\ cm}$ (mW)	3060
d (cm)	20.0

Conducted Power	(dBm)	9.50
	(mW)	8.91
Antenna Gain (dBi)		0.99
EIRP (dBm)		10.49
ERP	(dBm)	8.35
	(mW)	6.84

The Maximum time-averaged power or ERP whichever greater is 9 mW.

Thank you for your attention to this matter.

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