

Prepared by Andrei Sazonov		Product name/number DRC-D10 D3, DRC-D10 2ST D3		
Document responsible (approved by) Kristofer Hylén	Checked JEH	Date: YYYY-MM-DD 2014-11-12	Release A	File Name SCANRECO - DRC-10_10 2ST D3 RF Exposure Exemption Analysis.docx

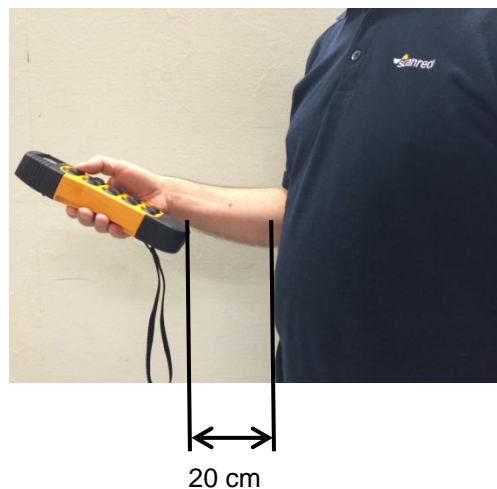
DRC-10 D3 and DRC-10 2ST D3 RF Exposure Exemption Analysis

Products: 2,4 GHz Transceivers DRC-10 D3 and DRC-10 2ST D3

Company: Scanreco AB, Box 47144/Årsta Skolgränd 22, S-10074, Stockholm, Sweden

The transceivers are designed for using as industrial hand-held / hand-operated remote control devices. The distance from the user to the antenna is at least 20 cm. Therefore the body SAR is not required. Extremity SAR exclusion is based on 40mm separation distance.

When the device is stored on the operators belt it must be shut off. Pressing the buttons and operating the machine while the device is hanging from the belt or any other place it not allowed. It must be held in the hand.



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Minimum test separation distance “d”: see 4.3.1 of 447498 “The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1).”

The closest distance from the antenna to the users hand is 44,5mm (see picture below).

The closest distance from the antenna to the users hand is 44,5mm.



The maximum duty cycle is 88,78%. The duty cycle is hardly coded in the firmware under production and cannot be changed by the user.

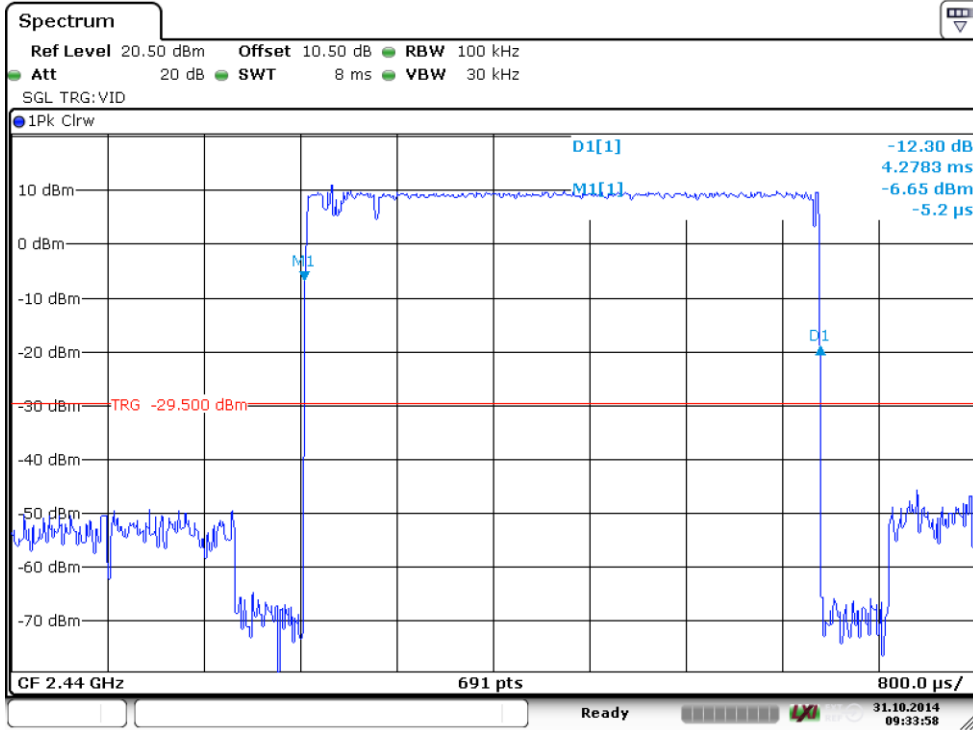
From the pictures below the duty cycle is :

Period: $6,4 \text{ s} / 83 \text{ hits} = 77,1 \text{ ms}$

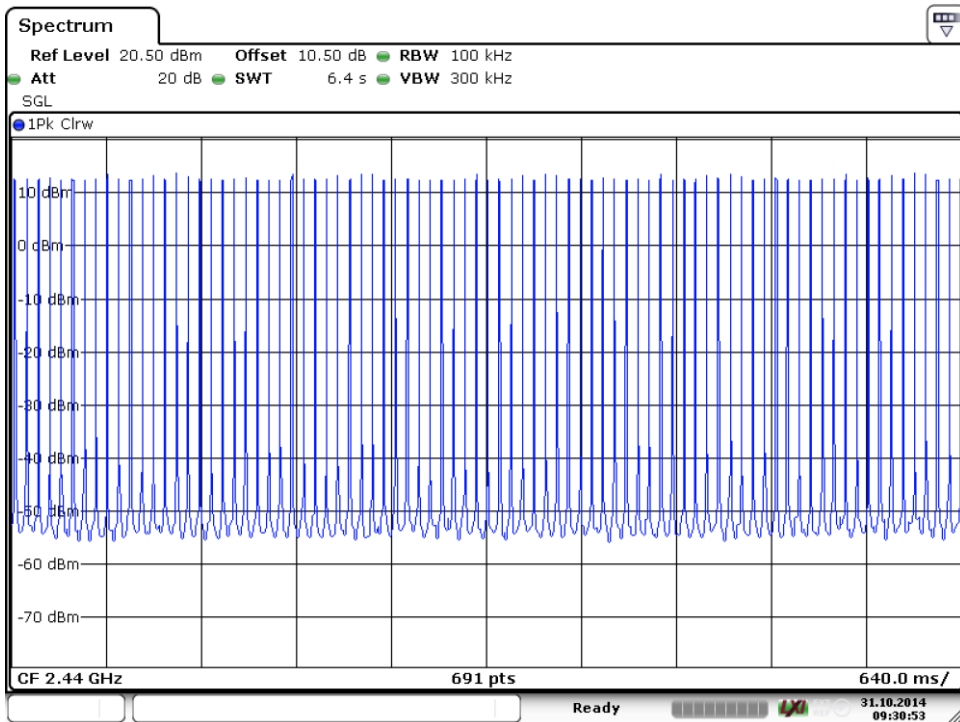
Pulse length: 4,278ms

Duty cycle: $(4,278 \text{ ms} / 77,1 \text{ ms}) * 16 \text{ channels} = 88,78\%$.

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Date: 31.OCT.2014 09:33:58



Date: 31.OCT.2014 09:30:53

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Prediction of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density
P = power input to the antenna
G = antenna gain
R = distance

Conducted output power:	19,94	(dBm)
Tune up tolerance	0,5	(dB)
Number of carriers	1	(N)
	110,7	(mW)
	0,1107	(W)
P Average	0,0982	(W)
Antenna gain:	0,0	(dBi)
Maximum antenna gain:	1,00	(numeric)
EIRP Average	0,098	(W)
ERP Average	0,0600	(W)
Distance:	20	(cm)
Duty Cycle:	88,78	(%)
Frequency:	2400	(MHz)
MPE Limit:	1	(mW/cm ²)
Power density:	0,0195	(mW/cm ²)
	0,195	(W/m ²)
Margin	17,1	(dB)

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FCC SAR Exclusion Analysis

Section 4.3.1 of 447498 D01 General RF Exposure Guidance v05r02
Extremity SAR exclusion based on 40 mm separation distance and 88,78%
maximum duty cycle for this hand-hand operated device is documented below.

P	19,94	dBm
Tune-up tolerance	0,50	dB
Duty Cycle	88,78	%
P average	98,25	mW
d	40	mm
f	2480	MHz
x	7,5	for 1-g SAR
SAR exclusion Limit	3,87	<7.5
Pmax	191	mW

* calculated using 447498 D01 General RF Exposure Guidance v05r02 section 4.3.1 1) [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]
·[vf(GHz)]

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Industry Canada SAR Exclusion Analysis

RSS-102 Issue 4

2.5.1 Exemption from Routine Evaluation Limits – SAR Evaluation

SAR evaluation is required if the separation distance between the user and the radiating element of the device is less than or equal to 20 cm, except when the device operates as follows:

- above 2.2 GHz and up to 3 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use;

The maximum radiated (e.i.r.p) source-based time averaged output power is 98,25mW. This is based on 88,78% duty cycle and 0 dBi max gain of internal antenna.

RSS-102 exemption Notice_2013DRS0911 Extremity SAR Evaluation:

SAR evaluation – exemption limits for routine evaluation based on frequency and separation distance at 2450 MHz, 40 mm, extremity = $173 \times 2,5 = 432,5$ mW.

Revision history

Release	Date: YYYY-MM-DD	Edited By	Changes
A	2014-11-12	Andrei Sazonov	First creation of document

Scanreco AB

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