



Maximum Permissible Exposure (MPE) & Exposure evaluation for 300 - 1500 MHz (FCC & ISED)

Company information

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Information of the device

No.	kind	content
1	Product marketing name (PMN)	DTE90x (TR10)
2	ifm Approval number	TR10
3	FCC ID	UN6-DTRUHFA01
4	ISED certification number	6799A-DTRUHFA01
5	Hardware version (HVIN)	DTE901, DTE902, DTE904, DTE905
6	Firmware version (FVIN)	-
7	min. Frequency [MHz]	902
8	max. Frequency [MHz]	928
9	max. power radiated EIRP [dBm]	25.2
10	origin of maximum radiated power EIRP	CTC advanced 1-0597/20-03-02



FCC - Prediction of MPE limit

Equations

The equation to predict the power density is used from OET Bulletin 65, Edition 97-01 from August 1997 on page 18.

$$S = \frac{P * G}{4\pi R^2} \quad \text{or} \quad S = \frac{EIRP}{4\pi R^2}$$

where:

S = Power density

P = power input to the antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

EIRP = equivalent isotropically radiated power

Limit values

The table below shows the limit value for the power density which is excerpted from Table 1 of CFR Title 47 §1.1310(e)(1) — Limits for Maximum Permissible Exposure (MPE).

Frequency Range [MHz]	Power Density [mW/cm²]	Averaging time [minutes]
300-1500	f/1500	<30

where f = frequency in MHz

Prediction of worst case power density

Frequency	f _{max}	902	MHz
Distance	R	20	cm
radiated power	EIRP	25.2	dBm
power density limit	S	0.601	mW/cm²
Calculated power density	S _{calculated}	0.0659	mW/cm²
Calculated percentage of power density limit:		10.96	%
out of distance for limit		6.62	cm

Conclusion

The radiated power density at evaluation distance of 20cm is within the limit.

The radiated power density is out of the limit, if the distance is < 6.62cm.



ISED - Prediction of MPE limit

RSS-102 - "Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)" Issue 5 March 2015, 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

Prediction of worst case power density

Frequency	f	902	MHz
Distance	R	20	cm
maximum radiated power	EIRP _{max}	25.2	dBm
maximum radiated power	EIRP _{max}	0.331	W
exclusion limit	PG	1.370	W
Calculated percentage of power density limit:		24.16	%

Conclusion

The RF exposure evaluation is not required.

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