To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

RENESAS

GaAs MES FET
NE76083A

C to Ku BAND LOW NOISE AMPLIFIER
N-CHANNEL GaAs MES FET

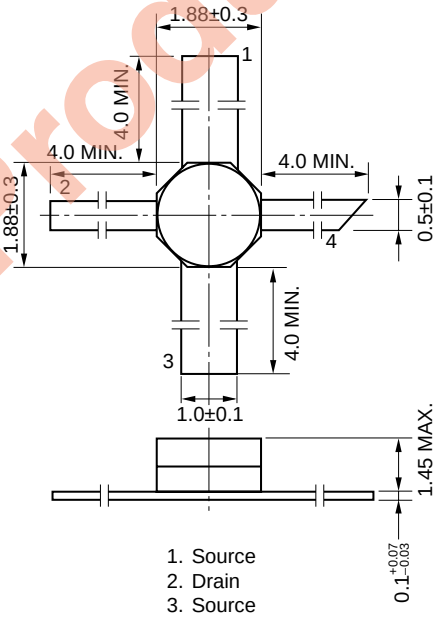
Discontinued Product

FEATURES

- Low noise figure
  NF = 1.6 dB TYP. at f = 12 GHz (NE76083A)
  NF = 2.4 dB MAX. at f = 12 GHz (NE76083A-2.4)
- High associated gain
  G_a = 9.0 dB TYP. at f = 12 GHz (NE76083A)
  G_a = 9.0 dB TYP. at f = 12 GHz (NE76083A-2.4)
- Gate length: L_g = 0.3 μm
- Gate width: W_g = 280 μm

PACKAGE DIMENSIONS

(Unit : mm)



1. Source
2. Drain
3. Source
4. Gate

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C)

Drain to Source Voltage	V_{DS}	5.0	V
Gate to Source Voltage	V_{GS}	–3.0	V
Gate to Drain Voltage	V_{GD}	–5.0	V
Drain Current	I_D	100	mA
Total Power Dissipation	P_{tot}	240	mW
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	–65 to +175	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PART NUMBER		NE76083A			NE76083A-2.4			UNIT	TEST CONDITIONS
PACKAGE CODE		83A			83A				
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Gate to Source Leak Current	I_{GSO}			10			10	μA	V_{GS} = –4 V
Saturated Drain Current	I_{DSS}	15	30	50	15	30	50	mA	V_{DS} = 3 V, V_{GS} = 0 V
Gate to Source Cutoff Voltage	$V_{GS(off)}$	–0.5	–0.8	–3.0	–0.5	–0.8	–3.0	V	V_{DS} = 3 V, I_D = 100 μA
Transconductance	g_m	30	40	70	30	40	70	mS	V_{DS} = 3 V, I_D = 10 mA
Noise Figure	NF		1.6	1.8		1.8	2.4	dB	V_{DS} = 3 V, I_D = 10 mA
Associated Gain	G_a	8.0	9.0		8.0	9.0		dB	f = 12 GHz

Document No. P12211EJ2V0DS00 (2nd edition)
(Previous No. TC-2260)
Date Published January 1997 N
Printed in Japan

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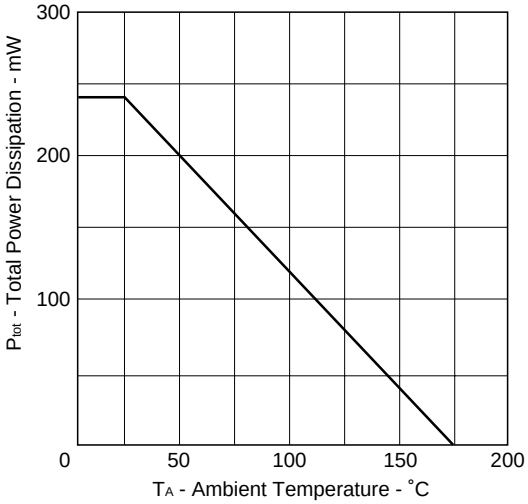
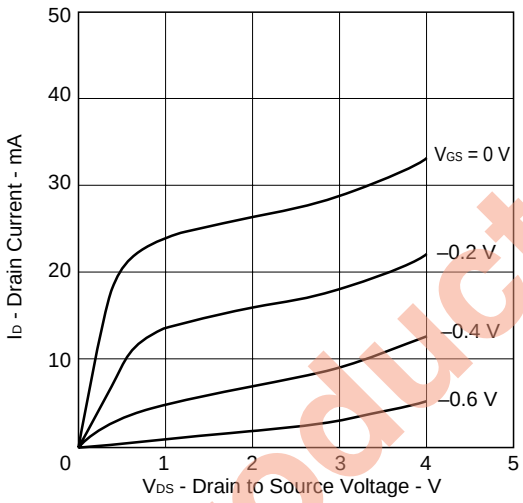
TYPICAL CHARACTERISTICS (T_A = 25 °C)

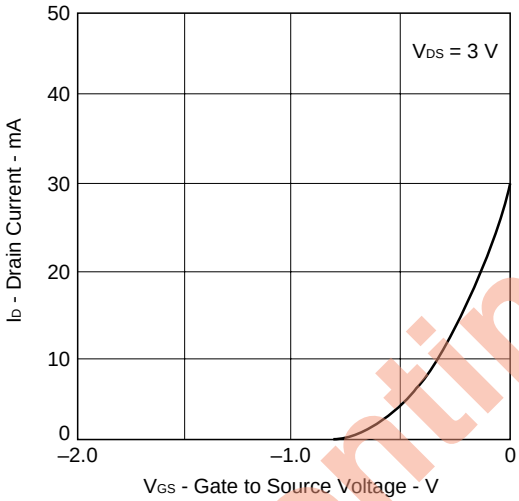
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



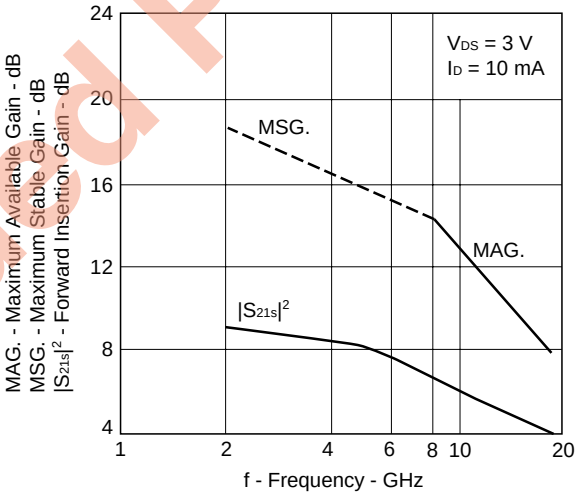
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



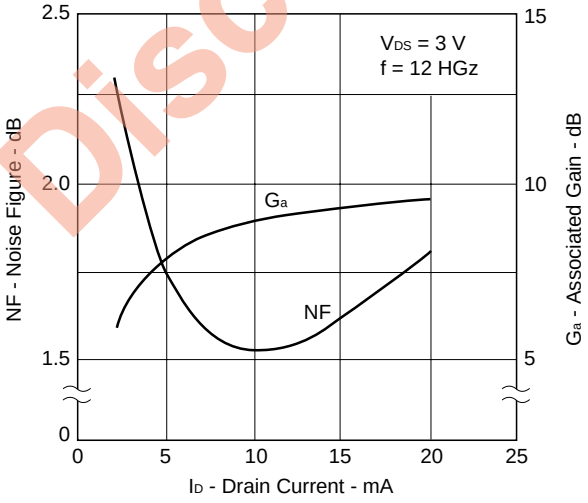
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



TYPICAL GAIN vs. FREQUENCY



NOISE FIGURE, ASSOCIATED GAIN vs. DRAIN CURRENT



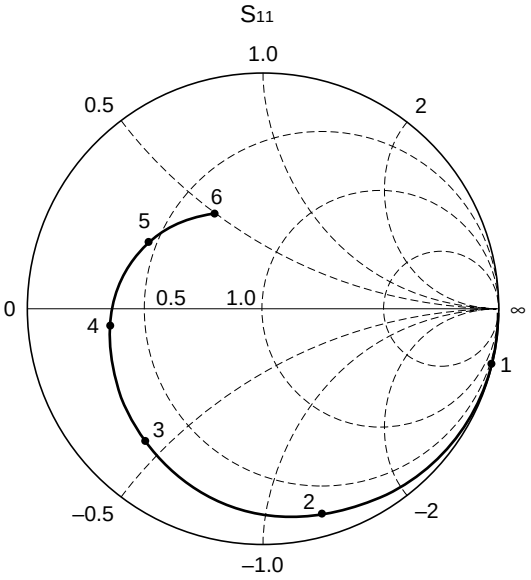
Discontinued Product

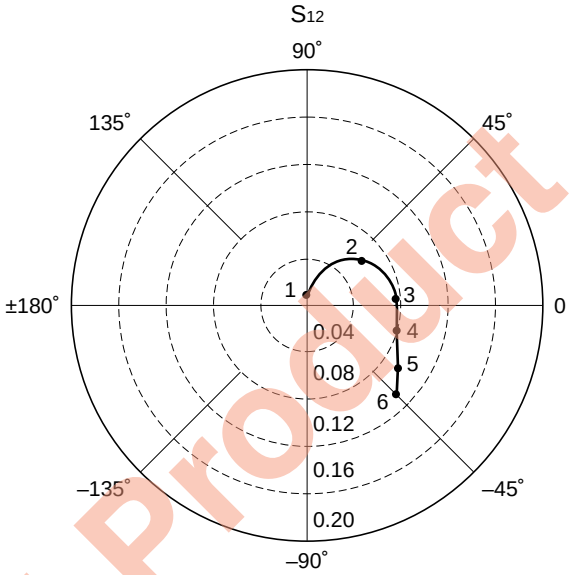
S-PARAMETERS

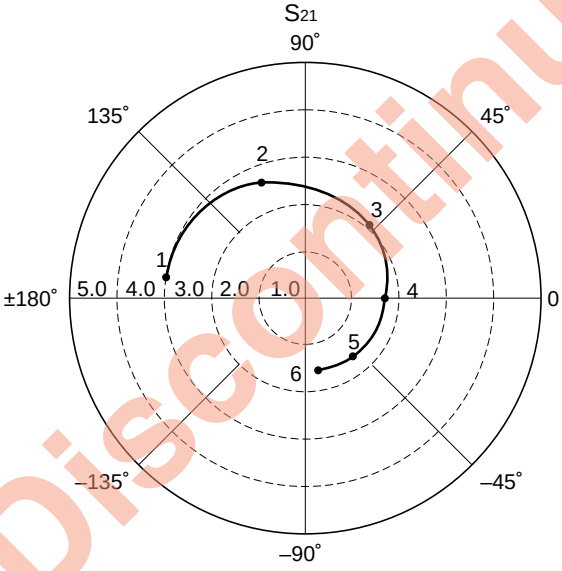
V_{DS} = 3 V, I_D = 10 mA

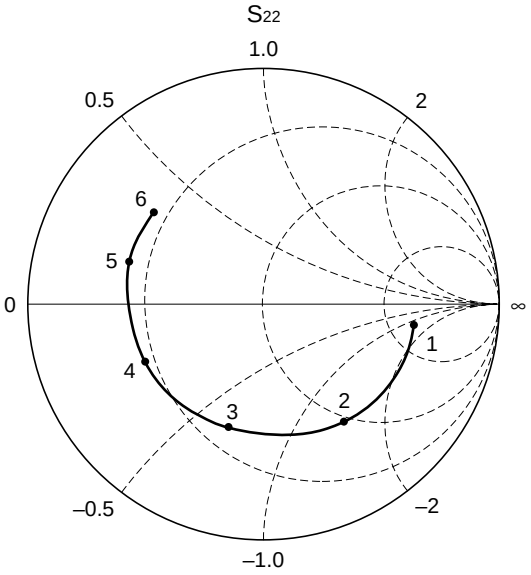
Start 500 MHz/Stop 18 GHz

Marker
1: 500 MHz
2: 4 GHz
3: 8 GHz
4: 12 GHz
5: 16 GHz
6: 18 GHz









Discontinued Product

S-PARAMETERS

V_{DS} = 3 V, I_D = 10 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)	MAG.	ANG. (deg.)
500	0.999	–9.6	3.058	170.5	0.009	82.6	0.648	–7.2
1000	0.993	–19.1	3.035	161.3	0.019	75.7	0.645	–14.3
1500	0.984	–28.5	3.000	152.2	0.027	68.9	0.640	–21.3
2000	0.969	–37.6	2.948	143.2	0.036	62.6	0.632	–28.2
2500	0.954	–46.6	2.894	134.5	0.043	56.3	0.624	–35.0
3000	0.938	–55.5	2.837	125.8	0.050	50.1	0.614	–41.9
3500	0.919	–64.3	2.774	117.4	0.056	43.9	0.603	–48.6
4000	0.899	–72.8	2.702	108.9	0.062	38.2	0.593	–55.5
4500	0.879	–81.2	2.628	100.7	0.066	32.4	0.580	–62.0
5000	0.859	–89.4	2.548	92.7	0.069	27.2	0.570	–68.7
5500	0.838	–97.3	2.468	84.8	0.072	22.0	0.559	–75.5
6000	0.821	–104.9	2.382	77.2	0.074	17.2	0.550	–82.1
6500	0.804	–112.0	2.298	69.9	0.074	12.7	0.534	–88.8
7000	0.790	–118.7	2.226	62.9	0.076	10.0	0.535	–94.0
7500	0.777	–125.1	2.152	56.0	0.077	5.9	0.538	–100.2
8000	0.765	–131.2	2.088	49.2	0.078	2.4	0.536	–106.5
8500	0.753	–137.0	2.028	42.7	0.078	–0.8	0.538	–112.7
9000	0.742	–142.6	1.974	36.2	0.078	–3.6	0.536	–118.4
9500	0.730	–148.2	1.927	29.8	0.078	–6.2	0.538	–124.3
10000	0.718	–153.8	1.879	23.3	0.078	–8.6	0.536	–130.5
10500	0.705	–159.2	1.834	17.0	0.078	–11.3	0.538	–136.5
11000	0.692	–164.7	1.791	10.7	0.078	–13.4	0.537	–142.7
11500	0.680	–170.0	1.748	4.5	0.078	–15.3	0.539	–148.5
12000	0.668	–175.3	1.712	–1.6	0.078	–17.1	0.540	–154.6
12500	0.658	179.8	1.674	–7.7	0.079	–18.6	0.543	–160.6
13000	0.647	174.8	1.641	–13.8	0.079	–20.4	0.550	–166.4
13500	0.636	170.0	1.610	–19.8	0.081	–21.8	0.554	–171.9
14000	0.623	165.2	1.586	–25.9	0.082	–23.3	0.563	–177.0
14500	0.609	160.4	1.567	–31.9	0.085	–25.2	0.570	177.2
15000	0.595	155.5	1.546	–38.1	0.088	–27.4	0.582	172.2
15500	0.578	150.4	1.536	–44.3	0.091	–30.5	0.588	165.3
16000	0.559	145.2	1.515	–50.6	0.094	–33.6	0.594	160.3
16500	0.539	139.6	1.508	–57.3	0.098	–36.9	0.594	154.1
17000	0.517	133.7	1.497	–64.0	0.100	–40.0	0.594	148.5
17500	0.494	127.9	1.477	–70.9	0.103	–43.0	0.604	143.7
18000	0.468	121.4	1.465	–77.9	0.108	–46.6	0.616	137.9

Discontinued Product

AMP. PARAMETERS

V_{DS} = 3 V, I_D = 10 mA

FREQUENCY MHz	GUmax dB	GAmax dB	$\|S_{21}\|^2$ dB	$\|S_{12}\|^2$ dB	K	Delay ns	Mason's U dB	G_1 dB	G_2 dB
500	37.33		9.71	–40.54	0.05	0.051	42.757	25.26	2.36
1000	30.59		9.64	–34.57	0.10	0.051	36.056	18.61	2.33
1500	26.75		9.54	–31.26	0.15	0.051	32.577	14.93	2.28
2000	23.74		9.39	–28.99	0.21	0.049	29.361	12.13	2.21
2500	21.84		9.23	–27.28	0.26	0.048	28.018	10.47	2.14
3000	20.28		9.06	–26.01	0.30	0.048	26.873	9.17	2.06
3500	18.92		8.86	–25.02	0.36	0.047	25.338	8.09	1.97
4000	17.68		8.63	–24.22	0.41	0.047	24.459	7.17	1.88
4500	16.60		8.39	–23.64	0.47	0.045	23.084	6.43	1.78
5000	15.63		8.12	–23.17	0.52	0.044	22.178	5.80	1.70
5500	14.75		7.85	–22.84	0.59	0.044	21.154	5.27	1.62
6000	13.97		7.54	–22.62	0.65	0.042	20.299	4.86	1.56
6500	13.21		7.23	–22.57	0.72	0.041	19.156	4.52	1.46
7000	12.66		6.95	–22.37	0.76	0.039	19.422	4.25	1.46
7500	12.17		6.66	–22.23	0.80	0.038	19.162	4.02	1.48
8000	11.69		6.40	–22.18	0.86	0.038	18.737	3.82	1.47
8500	11.26		6.14	–22.19	0.91	0.036	18.346	3.64	1.48
9000	10.85		5.91	–22.17	0.96	0.036	17.926	3.47	1.47
9500	10.49	13.59	5.70	–22.14	1.00	0.036	17.749	3.31	1.48
10000	10.09	12.27	5.48	–22.13	1.06	0.036	17.176	3.14	1.47
10500	9.73	11.58	5.27	–22.14	1.12	0.035	16.532	2.98	1.48
11000	9.37	11.01	5.06	–22.15	1.18	0.035	15.912	2.83	1.48
11500	9.03	10.54	4.85	–22.14	1.24	0.035	15.345	2.70	1.49
12000	8.73	10.15	4.67	–22.13	1.29	0.034	14.804	2.57	1.50
12500	8.45	9.82	4.48	–22.08	1.33	0.034	14.395	2.46	1.52
13000	8.22	9.57	4.30	–22.00	1.36	0.034	14.065	2.35	1.57
13500	7.98	9.31	4.14	–21.86	1.38	0.033	13.709	2.25	1.59
14000	7.80	9.14	4.01	–21.69	1.39	0.034	13.500	2.13	1.66
14500	7.62	9.00	3.90	–21.42	1.38	0.033	13.336	2.02	1.70
15000	7.48	8.93	3.78	–21.10	1.34	0.034	13.343	1.90	1.80
15500	7.33	8.79	3.73	–20.84	1.34	0.035	13.085	1.77	1.84
16000	7.13	8.57	3.61	–20.52	1.34	0.035	12.658	1.63	1.89
16500	6.95	8.36	3.57	–20.21	1.35	0.037	12.185	1.49	1.89
17000	6.75	8.06	3.50	–20.02	1.39	0.037	11.472	1.35	1.89
17500	6.57	7.86	3.39	–19.74	1.39	0.038	11.003	1.22	1.97
18000	6.46	7.81	3.32	–19.32	1.34	0.039	10.859	1.08	2.07

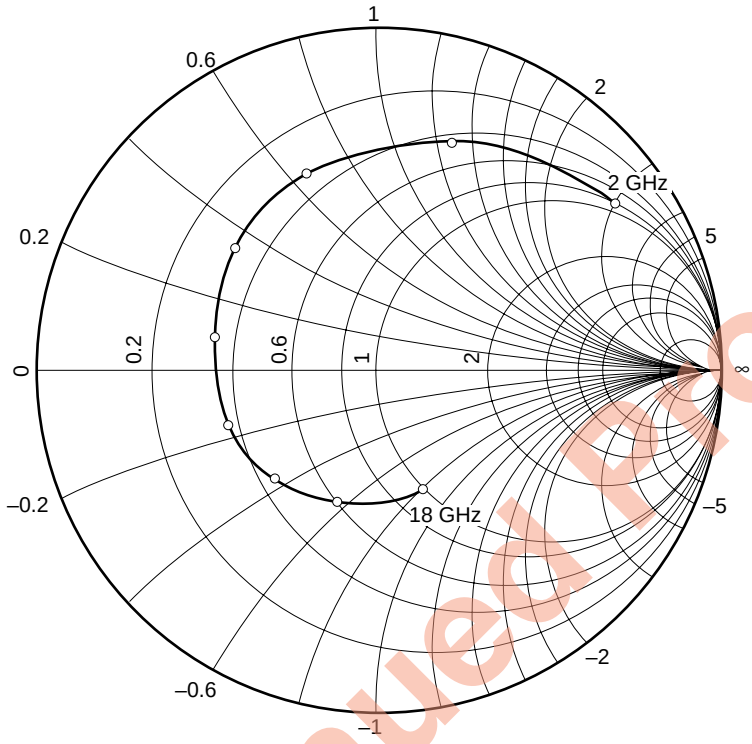
Discontinued Product

NOISE PARAMETERS

V_{DS} = 3.0 V

I_D = 10 mA

<Γopt. vs. frequency>



Start 2 GHz, Stop 18 GHz, Step 2 GHz

<Noise Parameter>

Freq. (GHz)	$NF_{min.}$ (dB)	Gain (dB)	Γopt.		$R_n/50$
			MAG.	ANG. (deg.)	
2.0	0.55	15.5	0.86	35	0.64
4.0	0.60	13.0	0.73	73	0.55
6.0	0.80	11.6	0.62	109	0.47
8.0	1.00	10.5	0.55	138	0.39
10.0	1.20	9.7	0.48	168	0.27
12.0	1.60	9.0	0.46	–161	0.24
14.0	1.80	8.4	0.42	–133	0.22
16.0	2.15	7.9	0.40	–105	0.19
18.0	2.50	7.4	0.38	–69	0.17

Discontinued Product

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

<TYPES OF SURFACE MOUNT DEVICE>

For more details, refer to our document "SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E).

Soldering process	Soldering conditions	Symbol
Partial heating method	Terminal temperature: 230 °C or below, Flow time: 10 seconds or below, Exposure limit*: None	

* Exposure limit before soldering after dry-pack package is opened.
Storage conditions: 25 °C and relative humidity at 65 % or less.

Note Do not apply more than a single process at once, except for "Partial heating method".

Precaution Avoid high static voltage or electric fields, because this device is GaAs field effect transistor with GaAs shottky barrier gate.

Caution

The Great Care must be taken in dealing with the devices in this guide.
The reason is that the material of the devices is GaAs (Gallium Arsenide), which is designated as harmful substance according to the law concerned.
Keep the law concerned and so on, especially in case of removal.

Discontinued Product

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NEC devices are classified into the following three quality grades:

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Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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