NEC

SILICON POWER TRANSISTOR
NEL2000 SERIES

NPN SILICON EPITAXIAL TRANSISTOR
L Band Power Amplifier

DESCRIPTION AND APPLICATIONS

NEL2000 series of NPN epitaxial microwave power transistors is designed for 1.8-2 GHz PHS/PCN/PCS base station applications.

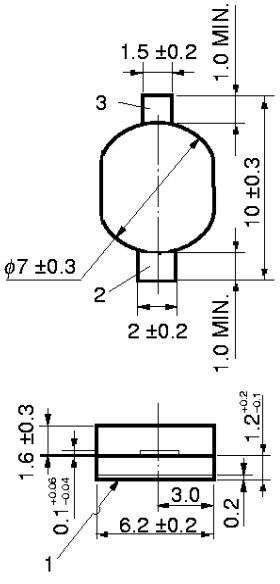
It incorporates emitter ballast resistors, gold metallizations and offers a high degree of reliability.

FEATURES

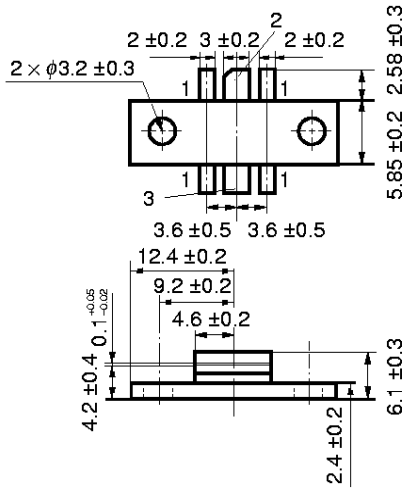
- High Linear Power and Gain
- Low Internal Modulation Distortion
- High Reliability Gold Metallization
- Emitter Ballasting
- 24 V Operation

OUTLINE DIMENSIONS

OUTLINE 01



OUTLINE F02



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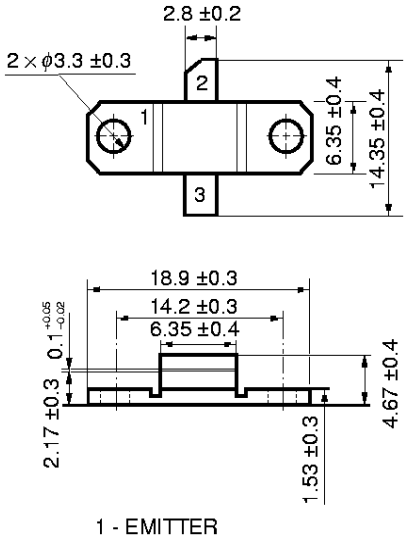

1 - EMITTER
2 - BASE
3 - COLLECTOR

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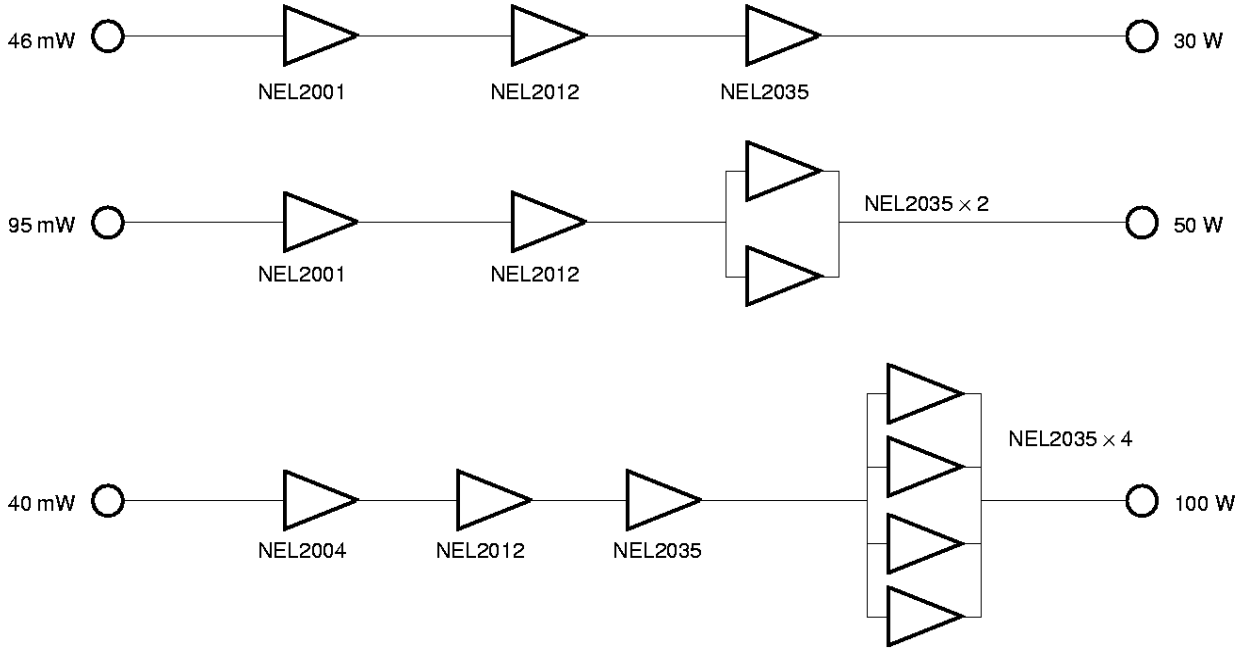
ORDERING INFORMATION

Part Number	OUTLINE
NEL200101-24	01
NEL2004F02-24	F02
NEL2012F02-24	
NEL2035F03-24	F03

APPLICATION

= Amplifier Diagrams =



ABSOLUTE MAXIMUM RATING (T_A = 25 °C)

PARAMETER	SYMBOL	SPECIFIED CONDITION	RATINGS				UNIT
			NEL200101-24	NEL2004F02-24	NEL2012F02-24	NEL2035F03-24	
Collector to Base Voltage	V_{CBO}		45	45	45	45	V
Collector to Emitter Voltage	V_{CER}	R = 10 Ω	30	30	30	30	V
Emitter to Base Voltage	V_{EBO}		3	3	3	3	V
Collector to Emitter Voltage	V_{CEO}		18	18	18	18	V
Collector Current	I_C		0.5	1.5	4	14	A
Power Dissipation	P_T		7.4	19.4	41.5	79.5	W
Thermal Resistance	Rth(j-c)		23.6	9	4.2	2.2	°C/W
Junction Temperature	Tj		200	200	200	200	°C
Storage Temperature	T_{stg}		–65 to 150	–65 to 150	–65 to 150	–65 to 150	°C

ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

PARAMETER	SYMBOL	SPECIFIED CONDITION	NEL200101-24			NEL2004F02-24			NEL2012F02-24			NEL2035F03-24			UNIT
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Collector to Emitter Cutoff Current	I_{CES}	V_{CE} = 24 V			1			3			8			10	mA
Collector to Emitter Voltage (Base to Emitter Registor = 10 Ω)	V_{CER}	I_C = 1 mA, R = 10 Ω I_C = 3 mA, R = 10 Ω I_C = 8 mA, R = 10 Ω I_C = 20 mA, R = 10 Ω	30	85		30	85		30	85		30	85		V
Collector to Emitter Voltage (Open Base)	V_{CEO}	I_C = 1 mA I_C = 3 mA I_C = 8 mA I_C = 20 mA	18	22		18	22		18	22		18	22		V
Collector to Base Voltage (Open Emitter)	V_{CBO}	I_C = 1 mA I_C = 3 mA I_C = 8 mA I_C = 20 mA	45	85		45	85		45	85		45	85		V
Emitter to Base Voltage (Open Collector)	V_{EBO}	I_C = 3 mA I_C = 8 mA I_C = 20 mA I_C = 25 mA	3	4.4		3	4.4		3	4.4		3	5.3		V
DC Forward Current Gain	h_{FE}	V_{CE} = 5 V, I_C = 0.1 A V_{CE} = 5 V, I_C = 0.3 A V_{CE} = 5 V, I_C = 0.8 A V_{CE} = 5 V, I_C = 1 A	30	100	150	30	100	150	30	100	150	30	100	150	
Output Capacitance	C_{ob}	V_{CE} = 24 V, f = 1 MHz		3			6.2			12.6			189		pF

NEL200101-24

PERFORMANCE SPECIFICATIONS (T_A = 25 °C)

CLASS AB OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 20 mA, V_{CC} = 24 V, CLASS AB		2.5		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 20 mA, V_{CC} = 24 V, CLASS AB		54		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.04 W, Iq = 20 mA, V_{CC} = 24 V, CLASS AB		8.8		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 2 W PEP, V_{CC} = 24 V, Iq = 20 mA, CLASS AB		–33		dB_C

CLASS A OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 100 mA, V_{CC} = 20 V, CLASS A	0.5	0.7		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 100 mA, V_{CC} = 20 V, CLASS A		30		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.01 W, Iq = 100 mA, V_{CC} = 20 V, CLASS A		10.8		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 0.5 W PEP, V_{CC} = 20 V, Iq = 100 mA, CLASS A		–36		dBc

NEL2004F02-24

PERFORMANCE SPECIFICATIONS (T_A = 25 °C)

CLASS AB OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 40 mA, V_{CC} = 24 V, CLASS AB	5	7		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 40 mA, V_{CC} = 24 V, CLASS AB	40	46		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.2 W, Iq = 40 mA, V_{CC} = 24 V, CLASS AB		9.5		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 5 W PEP, V_{CC} = 24 V, Iq = 40 mA, CLASS AB		–34		dBc

CLASS A OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 250 mA, V_{CC} = 20 V, CLASS A		2		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 250 mA, V_{CC} = 20 V, CLASS A		35		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.01 W, Iq = 250 mA, V_{CC} = 20 V, CLASS A		12		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 1 W PEP, V_{CC} = 20 V, Iq = 250 mA, CLASS A		–37		dBc

NEL2012F02-24

PERFORMANCE SPECIFICATIONS (T_A = 25 °C)

CLASS AB OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 75 mA, V_{CC} = 24 V, CLASS AB	12	16		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 75 mA, V_{CC} = 24 V, CLASS AB	40	55		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.5 W, Iq = 75 mA, V_{CC} = 24 V, CLASS AB		10.9		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 12 W PEP, V_{CC} = 24 V, Iq = 75 mA, CLASS AB		–33		dBc

CLASS A OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 750 mA, V_{CC} = 20 V, CLASS A		5		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 750 mA, V_{CC} = 20 V, CLASS A		35		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.07 W, Iq = 750 mA, V_{CC} = 20 V, CLASS A		13.8		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 2.5 W PEP, V_{CC} = 20 V, Iq = 750 mA, CLASS A		–35		dBc

NEL2035F03-24

PERFORMANCE SPECIFICATIONS (T_A = 25 °C)

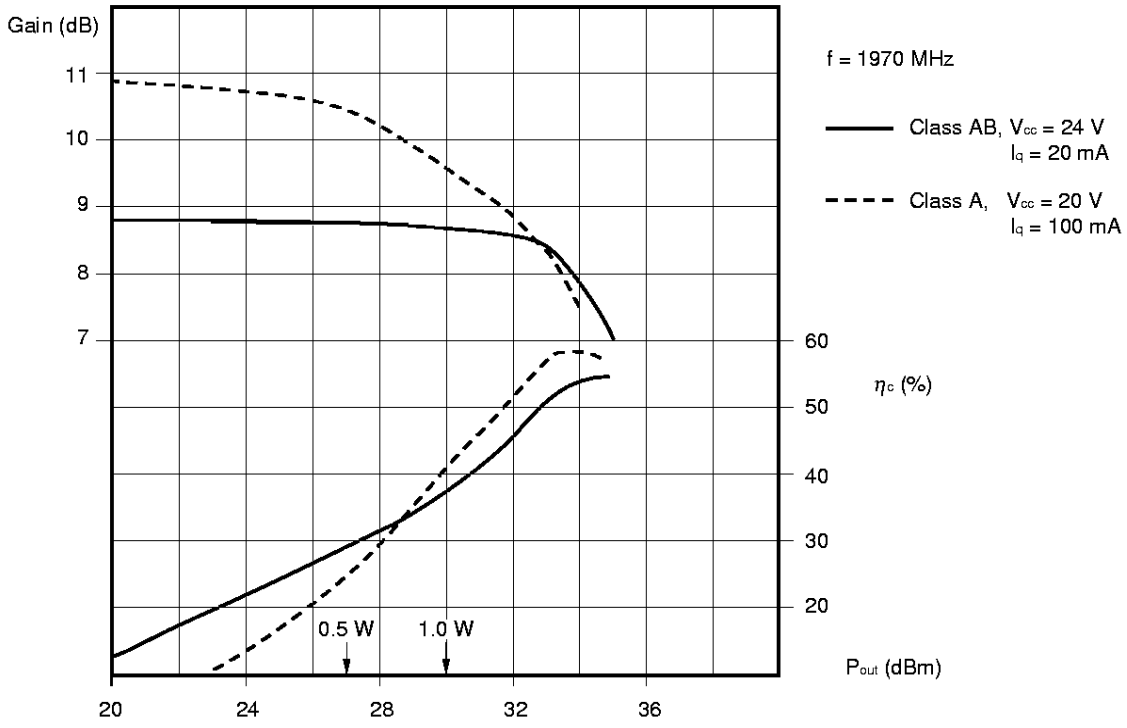
CLASS AB OPERATION

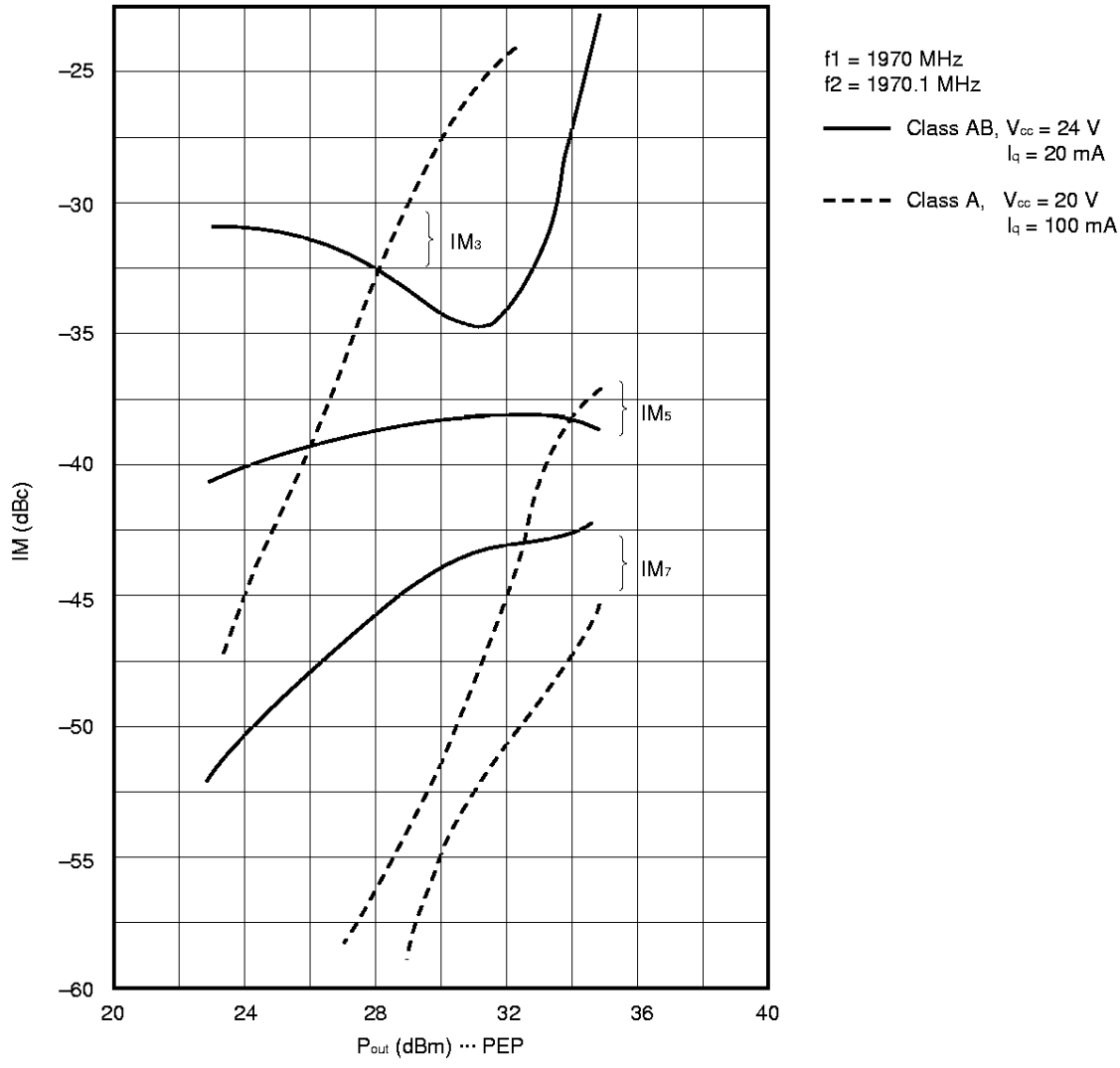
PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 100 mA, V_{CC} = 24 V, CLASS AB	30	33		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 100 mA, V_{CC} = 24 V, CLASS AB	40	50		%
Linear Gain	GL	f = 1.97 GHz, Pin = 2 W, Iq = 100 mA, V_{CC} = 24 V, CLASS AB		9		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 30 W PEP, V_{CC} = 24 V, Iq = 100 mA, CLASS AB		–33		dBc

CLASS A OPERATION

PARAMETER	SYMBOL	SPECIFIED CONDITION	MIN.	TYP.	MAX.	UNIT
Output Power	P_{1dB}	f = 1.97 GHz, Iq = 1.5 A, V_{CC} = 16 V, CLASS A		7		W
Collector Efficiency	ηc	f = 1.97 GHz, P_{out} = P_{1dB}, Iq = 1.5 A, V_{CC} = 16 V, CLASS A		30		%
Linear Gain	GL	f = 1.97 GHz, Pin = 0.1 W, Iq = 1.5 A, V_{CC} = 16 V, CLASS A		10.7		dB
3rd Order Intermodulation	IM_3	f = 1.97 GHz, Δf = 100 kHz, 5 W PEP, V_{CC} = 16 V, Iq = 1.5 A, CLASS A		–33		dBc

NEL200101-24





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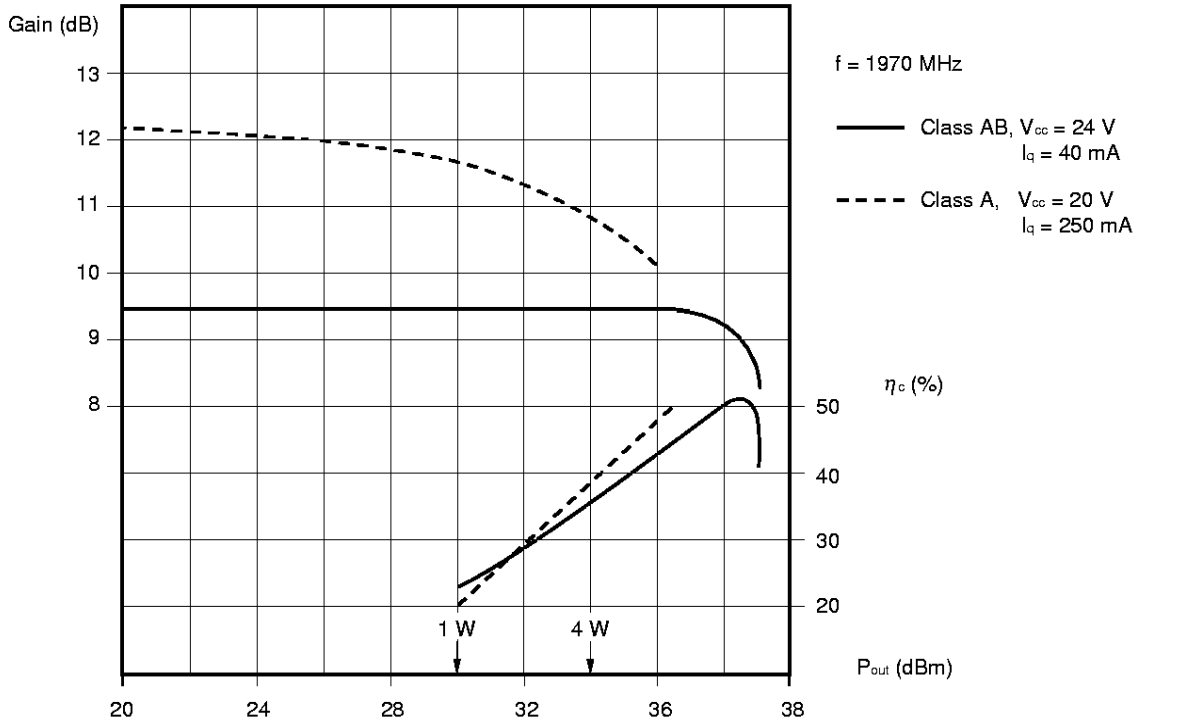

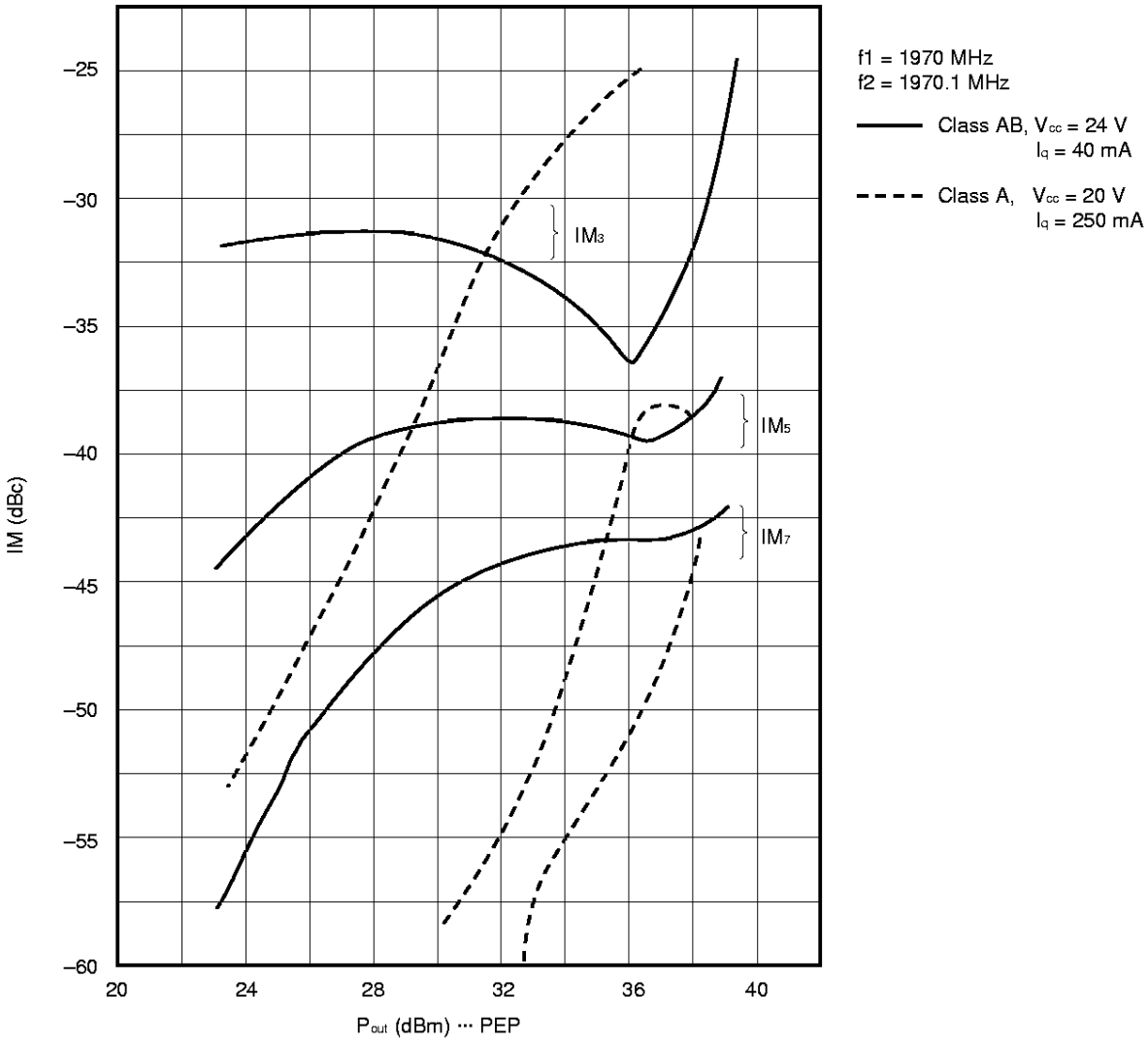

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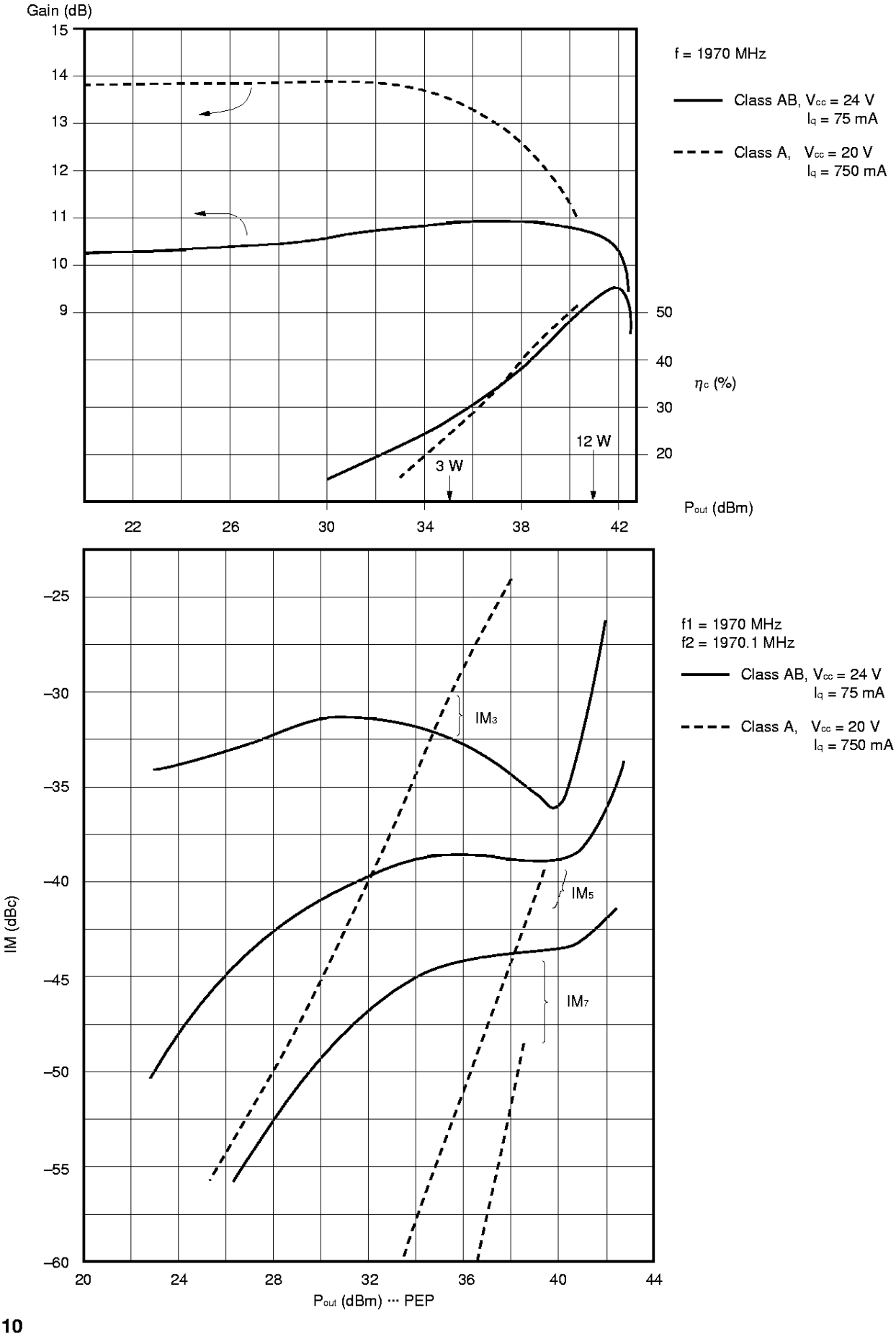

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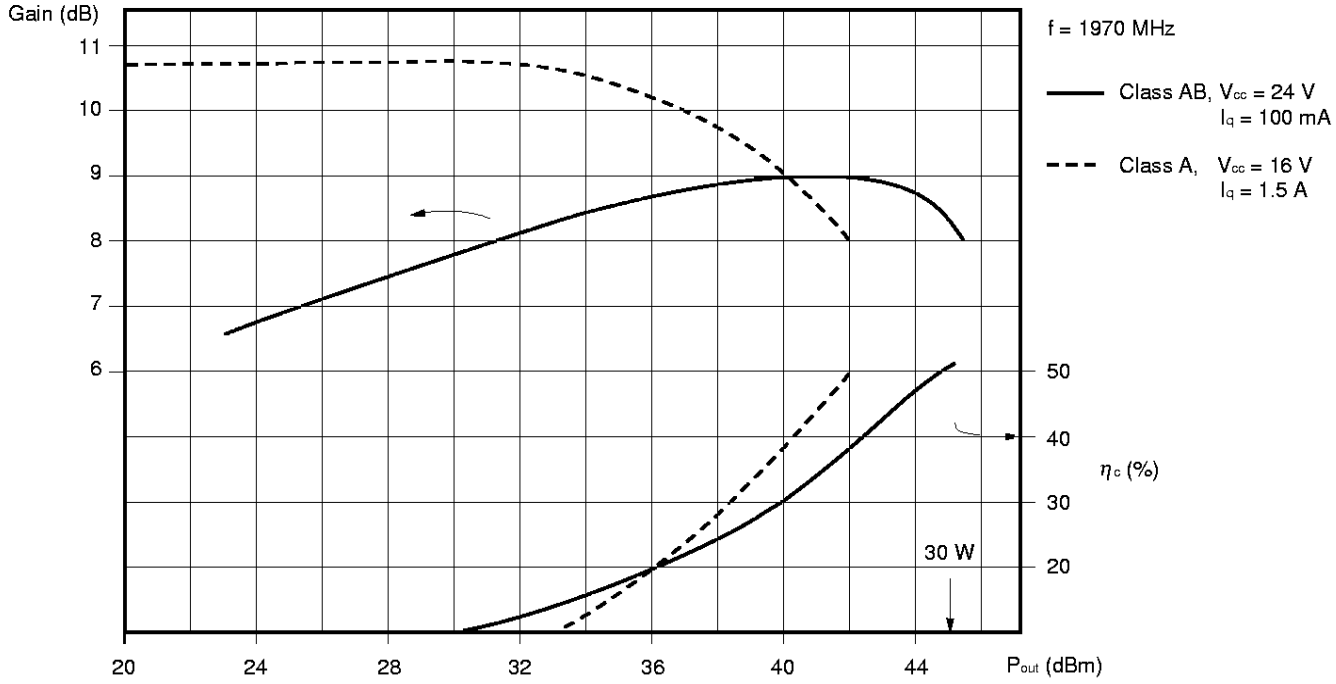

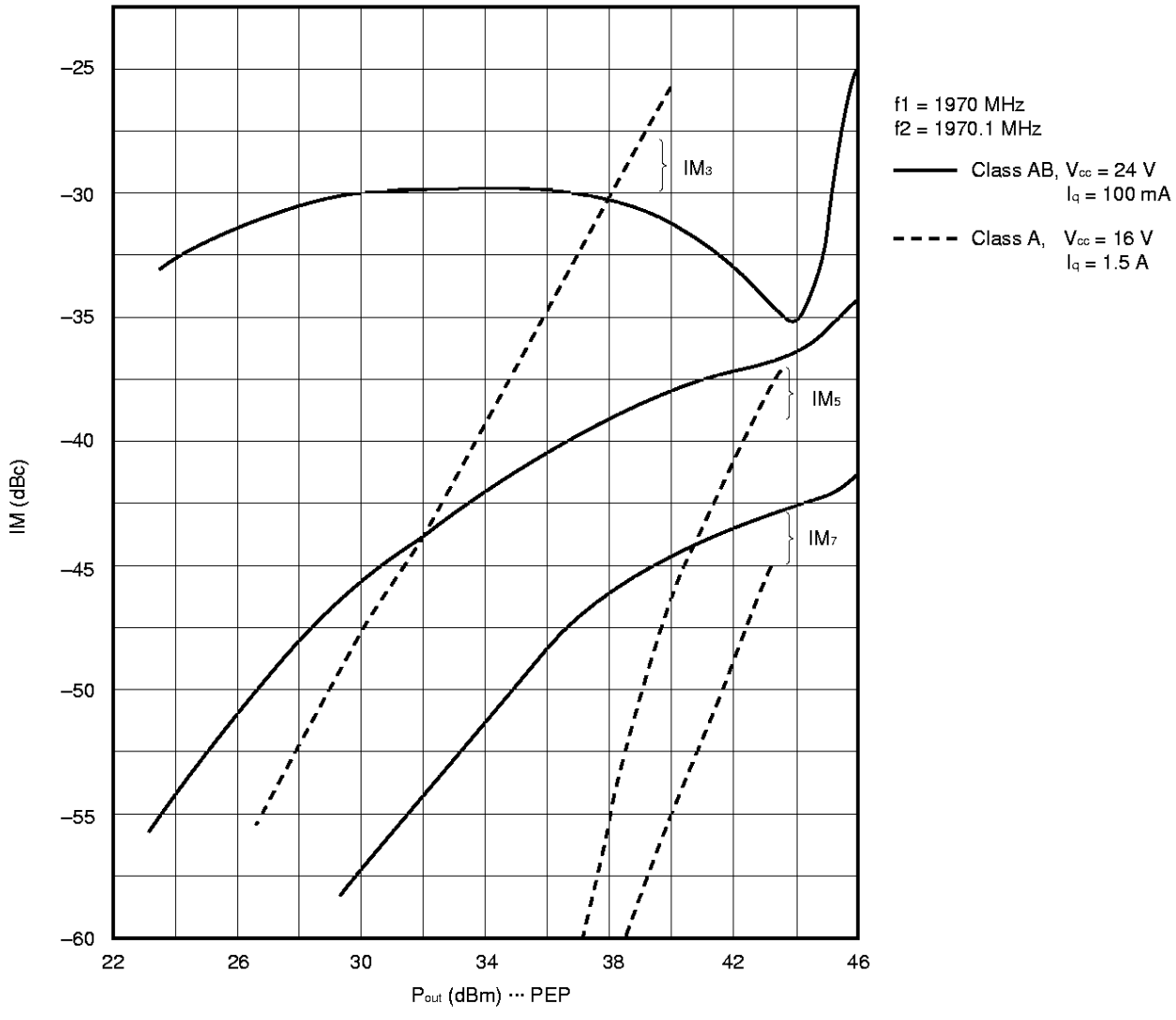

CAUTIONS ON HANDLING DEVICES

This device employs beryllia ceramics (beryllium oxide) internally. Inhalation of beryllium oxide powder or vapor into the human respiratory system may cause hazards such as breathing difficulties and other problems.

Therefore, do not disintegrate or chamically process this device.

Moreover, when disposing of this device, be sure to separate it from general industrial waste and domestic garbage.

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