

TECHNICAL SPECIFICATION FOR

SP-230/250

LOW COST 5 WATT HANDPORTABLE

ISSUE 1.1

LAND MOBILE RADIO R&D TEAM

MAXON KOREA

SIGN OFF

MAXON DIVISION	SIGNATURE	DATE
MARKETING MAI		
MARKETING MEL		
MAXKOR		

SP-230/250 TECHNICAL SPECIFICATION

TRANCEIVER NOMINAL PERFORMANCE

MODEL:	SP-230/250 U2
EQUIPMENT TYPE:	Handportable
PERFORMANCE SPECIFICATIONS:	ETS 300-086
	TIA/EIA-603
BAND:	UHF/VHF
CHANNEL SPACINGS:	12.5KHz,20KHz 25KHz PROGRAMMABLE
RF OUTPUT POWER:	5 / 1 WATT
MODULATION TYPE:	F3E
AUDIO POWER:	500mW (EXT WITH 16 OHM)
	1W (INT WITH 4 OHM)
INTERMEDIATE FREQUENCY:	45.1MHz
	455KHz
NO OF CHANNELS:	4/16 Channel BCD Encoder SW
FREQUENCY SOURCE:	SYNTHESIZER
OPERATION RATING:	INTERMITTENT
	90 : 5 : 5 (STBY:RX:TX)
POWER SUPPLY:	NIMH
	7.5 VDC NOMINAL EXTREME
	+/- 10% VDC EXTREME

TEMPERATURE RANGE:

STORAGE	80 MAX -40 MIN.(EXTREME)
OPERATING	25 +/-10 NOM(ROOM TEMP)
	60 MAX -30 MIN.

CURRENT

OFF	< 150uA
STANDBY(MUTED)	
BAT SAVE ON(100mS, 400mS)	< 55mA
BAT SAVE OFF	< 80mA
UNMUTED	
100% MAX AF POW	< 400mA
TRANSMIT	
5 WATT RF POW	< 2.4 A

SWITCHING RANGE TX AND RX (WITHOUT RE-TUNING)

		RX	TX
VHF	V1	138.000-162.000MHz	138.000-162.000MHz
	V2	148.000-174.000	148.000-174.000
UHF	U2	440.000-470.000	440.000-470.000
	U1	400.000-430.000	400.000-430.000
	U5	420.000-450.000	420.000-450.000
	U3	470.000-490.000	470.000-490.000
	U4	490.000-512.000	490.000-512.000

BATTERY LIFE (MINIMUM) METHOD AS TIA/EIA-603 FEB 1993

Power Save : 100mS off / 400mS on

1350mA

POWER SAVE ON 8 Hrs

PHYSICAL PARAMETERS

TBD

TRANSMITTER

TEST METHOD IS TIA/EIA-603 FEB 1993

1	CARRIER POWER	NOM.	MAX.	MIN
		5.0W	< 6.0	> 4.5
		1.0W	< 1.4	> 0.7
2	SUSTAINED TRANSMISSION	METHOD(TX POWER VS TIME) NOMINAL CONDITIONS		
		5	10	30 SEC
		> 90%	>85%	>80% POWER
3	FREQUENCY ERROR	< 0.5KHz NOMINAL CON. VHF < 0.75KHz NOMINAL CON. UHF ± 5PPM EXTREME CON. VHF ± 3PPM EXTREME CON. UHF		
4	AUDIO FREQUENCY DEV			
WITHOUT SUB AUDIO TONE MODULATION:				
	CHANNEL SPACING:	(@NOM/EXTREME CONDITIONS)		
		NOM.	PEAK	MIN.
	25KHz	3	± 5.0	± 3.8
	12.5KHz	1.5	± 2.5	± 1.8
WITH SUB AUDIO TONE MODULATION @ 10% PEAK DEVIATION				
	CHANNEL SPACING:	@ EXTREME CONDITIONS		
	25KHz	± 5.0 PEAK		
	12.5KHz	± 2.5 PEAK		
5	AUDIO CHARACTERISTIC:	MEATHOD AS TIA/EIA-603		
	MODE TYPE F3	WITHIN +1/-3dB of 6dB OCT. @ 300Hz to 2.55KHz for 12.5KHz C.S @ 300Hz to 3.0 KHz for 25KHz C.S		
6	ADJACENT CHANNEL POWER			
	25KHz	< 70 dBc @nominal conditions < 65 dBc @extreme conditions		
	12.5KHz	< 60 dBc @nominal condition < 55 dBc @extreme codition		
7	TX SPURIOUS EMISSION(CONDUCTED)			
	BELOW 1 GHz	< -36 dBm @nominal		
	BELOW 4 GHz	< -30 dBm @nominal		
8	MODULATION SENSITIVITY			
	At ACCESSORY/MIC CONNECTOR	15mV	>20mV>35mV	60% PEAK DEV
9	TRANSMITTER AUDIO DISTORTION (WITHOUT CTCSS)			
	@1KHz	< 5% < 10% @extreme condition		

10 HUM & NOISE(Residual Modulation) Method as FTZ 17 TR 2049 July 1988

12.5kHz C.S.

>40dB (with PSOPH)

25kHz C.S.

>40dB (with no PSOPH)

11 Modulation Symmetry

<10% Peak Dev

Method(Peak Positive-Peak Negative)

(@ 1KHz input for nominal dev + 20dB)

12 Load StabilityNo osc at $\geq 10:1$ VSWR all phase angles
and suitable antenna**13 Peak Deviation Range Adjustment**

Channel Spacing:

No Destory at $\geq 20:1$ All phase angle

(@Nominal/Extreme Conditions)

(@ 1KHz, Nom. Dev + 20dB)

	Min.	Max.
25KHz	>3.5	<6.0
20KHz	>2.8	<5.0
12.5KHz	>1.5	<4.0

TX TONE MODULATION CHARACTERISTICS**SUB AUDIO TONES-CTCSS****1 Tone Range**

67 TO 250Hz @ 0.3% Accuracy

2 Tone Standard

TIA/EIA-603

3 Non-Standard Tones

50-260Hz @ 0.3% Accuracy

4 Nominal Tone Deviation

15% (10%-20%) Peak System Deviation USA

10% (8%-15%) Peak System Deviation UK

5 Deviation Range Adjustment

0% Min. Peak Dev

20% Max. Peak Dev

Method(Using internal control @ nominal conditions)

**6 Tone Deviation Variation vs. Tone Freq.
and across Switch Range:**

<10% Peak Dev(@ 10% Peak system dev)

Method(Tone Freq. vs. Deviation)

7 Tone Distortion

5% THD

Method(@ 10% Peak system DEVITION)

8 Tx Audio Rejection

>25dB

Method (radio of Peak Dev at 300Hz)
and Peak Dev at highest)

(Standards tone frequency)

9 Response Time

<10ms (Peak level after Tx on and within 1%accuracy)

Method (time to generate tone to 90%)

10 Hum & Noise

>35 WITH PSOPH

Method (using any standard CTCSS tone)

@10% Peak deviation (Using 300Hz HPF nad 3KHz LPF)

SUB AUDIO TONES-DCS**1 Tone Standard**

Normal and inverted

2 Tone Deviation

15% +/-5% Peak system deviation for MAI

10% +/-3% Peak system deviation for MEL

3. Deviation Range Adjustment

0% Min. Peak Dev

25% Max. Peak Dev

Method using internal control(@ nominal conditions)

4 Deviation Variation vs.DCS

Code and Carrier Freq:

 $\pm 5\%$

Method(and DCS Code vs.deviation over switching)

SUB AUDIO TONES-DEVIATION COMPARISON

1 Deviation Difference	<10% Peak Dev Method(deviation with CTCSS minus deviation with DCS Code 346 @ single channel with no adjustment) (@ Nominal and extreme conditions)
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RECEIVER

Performance without Sub Audio Modulation

1 Sensitivity	
12dB Sinad	UHF: <-117dBm, VHF: <-118dBm (@ Nominal conditions across switching range)
12dB Sinad	UHF: <-115dBm, VHF: <-116dBm (@ Extreme conditions across switching range)
2 Amplitude Characteristic	<± 3dB
3 Adjacent Channel Selectivity	
25KHz Channel Spacing	>60dB (@Nominal conditions) >55dB (@Extreme conditions)
12.5KHz Channel Spacing	>50dB (@Nominal conditions) >45dB (@Extreme conditions)
4 Spurious Response Rejection	70dB (100KHz -4GHz) (@NOMINAL CONDITIONS) (ACROSS SWITCHING RANGE)
Image Response	>60dB
1/2 IF Response	>60dB
Others	>60dB
5 Intermodulation Response Rejection	
± 25K/50KHz	>60dB
± 50K/100KHz	>60dB
6 Rx Spurious Emissions(Conducted)	(@ Nominal conditions)
9kHz - 1GHz	< -57dBm
1GHz -4GHz	< -47dBm
7 Rx Spurious Emissions(Radiated)	(@Nominal conditions)
9kHz - 1GHz	< -57dBm
1GHz -12.75GHz	< -47dBm
8 AF Power	550mW Maximum 10% Dist (EXT)At 8 Ohm) 1.1W (INT) At 4 Ohm Method (at < 10% THD Level)
9 Volume Control Adjustment Range	< 10mW Min > 600mW Max. (8 OHM EXT) Method (Lowest and Highest) (Volume control Positions)
10 AF Distortion	Method as FTZ 17 TR 2049
1kHz	<5% (@nominal conditions) <10% (@extreme conditions)
11 AF Frequency Response	Method as TIA/EIA-603
MOD TYPE F3	Within +1/-3 dB of Limit WRT 1KHz (@300Hz to 3KHz for 20,25KHz Cham. Spacing)
12 Rx Hum & Noise	Method as TIA/EIA-607
25KHz CP	<40dB No Psoph.
12.5KHz CP	<40dB With PsoPh.

13 Receiver Response Time	<16mS Method as EIA RS 316 B May 79
14 Squelch Opening Range	Method (Increase Level until Sq.open) 10 dB SINAD @Nomal Condition Power Save OFF >RF Level for 6 to 14dB Sinad Power Save ON MAX 16 dB Sinad (@NOMAL Condition) MAX 18 dB Sinad (@EXTRME Conditon)
15 Squelch Closing Range Hysterysis	Method (Decrease level until Sq. close) 0 - 6 DB SINAD (@Nominal Conditions)
16 Squelch Attack Time rf level at Threshold rf level at Threshold + 20dB	Method(Time to Sq. open after signal applied) <40mS <30mS
17 Squelch Decay Time Min. Max.	Method(Time to Sq close after signal removed) 5mS 20mS
18 Antenna Socket Input Match	>10dB return loss Method(Using network analyser over switching range)
19 Local Oscillator Frequency Temp Stability	{30 to +60deg):1st < 5PPM, 2nd < 15PPM Method(Direct measurement)
20 Local Oscillator Frequency Aging Rate	+/-2PPM/YEAR

RX TONE DEMODULATION CHARACTERISTICS

SUB AUDIO TONES-CTCSS

1 Tone Range	67Hz to 250Hz
2 Tone Standard	TIA/EIA-603 Standard
3 Non-Standard Tones	50-260Hz
4 Decoder Sensitivity	Menthod (Decrease Signal level(@10% Peak Deviation) (No Audio Tone) HIGHEST TONE <= 8dB SINAD MID TONE <= 8dB SINAD LOWEST TONE <= 8dB SINAD
5 Decoder + Squelch Attack Time Highest Tone Mid Tone Lowest Tone	Method (Time to Sq open after RF and tone applied) <200mS <200mS <220mS
Decoder Only Attack Time Highest Tone Mid Tone Lowest Tone	Method (Time to sq open after tone applied with RF Present) <120mS <130mS <150mS
7 Decoder Decay Time	<75mS Max. Method (Time to sq closed after signal removed)
8 Decoder Bandwidth	Accept ± 0.5% Tone Frequency; Reject ± 3.0% ToNE Frequency; Method (Offset Tone Freq)
9 RX Audio Rejection	>25dB Method(Radio of Rx Audio Response between 300Hz and Highest Tone Frequency)
10 False Decoder Probability	<1 False/5 Hrs) Method(In Windeband FM Noise)
11 Hum & Noise	>40dB Psoph, >35dB No Psoph (@highest Tone Freq)

SYNTHESIZER

REFERENCE CRYSTAL

Frequency	12.8MHz
Holder Type	HC-18
	<u>Temperature</u> <u>Accuracy</u>
	-30°C to +60C + 5.0PPM
Temperature Characteristic	See Manufacturers Graph
Aging Rate	<2PPM/YEAR IN 1ST YEAR. <1PPM/YEAR THEREAFTER
Lock Time	<10 mS
Tx to Rx same Frequency	< 20 (No Power Saving)
Rx to Tx same Frequency	< 20
Rx to Rx over ½	
Switching Bandwidth	< 20mS
Rx to Tx/Tx to Rx over Switching	
Bandwidth	< 20mS

ENVIRONMENTAL (PERFORMANCE WITHOUT DEGRADATION UNLESS STATED)

TEMPERATURE	deg C
OPERATING	-30 to +60 with degradation specified @EXTREME
STORAGE	-40 to +80
RECHARGING	-10 to +55
ESD	20kV (C-MIC >=15kV)
VIBRATION	MIL STD 810 C PROCEDURES , , AND IEC68 26

MAXON

A World of communication

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