

Model	HNA-16MM64	Rev.① 12-Mar-2012
Application	AUDIO	
Color of Illumination #6)	GREEN (G. :x=0.250,y=0.439) Cd-free REDDISH ORANGE (Cd-free Rsh.O. :x=0.62,y=0.37)	

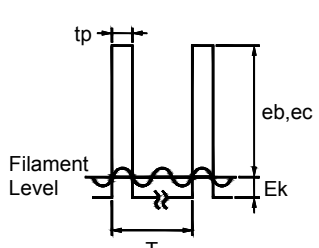
### ABSOLUTE MAXIMUM RATINGS #4)

Item	Symbol	Min.	Max.	Unit	Condition
Filament Voltage #2)	Ef	—	5.80	Vac	eb,ec = Typ.
Anode Voltage	eb	—	32.0	Vp-p	Ef=Typ.
Grid Voltage	ec	—	32.0	Vp-p	
Operating Temperature	Topr	-40	+85	°C	—

### RECOMMENDED OPERATING CONDITION #5)

Item	Symbol	Min.	Typ.	Max.	Unit
Filament Voltage #2)	Ef	4.50	5.00	5.5	Vac
Peak Anode Voltage	eb	24.0	27.0	30.0	Vp-p
Peak Grid Voltage	ec	24.0	27.0	30.0	Vp-p
Cut-Off Bias Voltage	Ek	8.8	—	11.8	Vdc
Duty Factor	Du	—	1/17	—	—
Pulse Width	tp	—	100	—	μs
Operating Temperature	Topr	-20	—	+70	°C
Storage Temperature	Tstg	-55	—	+85	°C

### ELECTRICAL CHARACTERISTICS

Item	Test Condition	Symbol	Min.	Typ.	Max.	Unit	
Filament Current	Ef= 5.0 Vac ,eb=ec=0	If	203	225	248	mAac	
Anode Current #1)	Ef= 5.0 Vac eb= 27.0 Vp-p ec= 27.0 Vp-p	ib	1G,6G,10G 12G,14G	—	4.0	8.0	mAp-p
			2G~5G, 7G~9G, 11G,13G	—	6.0	12.0	
			15G	—	25.0	43.0	
			16G	—	56.0	95.0	
Grid Current #1)	Duty= 1/17 tp= 100 μs tb= 0 μs	ic	6G,10G, 12G,14G	—	4.0	8.0	mAp-p
			1G~4G,7G, 8G,13G	—	6.5	13.0	
			5G,9G,11G	—	8.0	16.0	
			15G	—	36.0	61.0	
			16G	—	53.0	90.0	
Brightness	 <p>Filament Level</p> <p>tp</p> <p>T</p> <p>eb,ec</p> <p>Ek</p>	GREEN	350 (102)	700 (204)	—	cd/m <sup>2</sup> (ft-L)	
		Cd-free Rsh.O.	60 (18)	120 (35)	—		
Brightness Ratio Between Digits	(All Segs are lit)	L(Max.) / L(Min.)	—	—	2		
Grid Cut-Off Voltage #3)	Ef= 5.0 Vac, Eb= 27.0 Vdc, Ec=Vary	Ecco	(-8.8)	—	—	Vdc	
Anode Cut-Off Voltage #3)	Ef= 5.0 Vac, Du= 1/17 ec= 27.0 Vp-p, Eb= Vary	Ebco	(-8.8)	—	—	Vdc	

#1. Unless otherwise specified, the anode and the grid current should be measured for each grid when all anodes turn on.

#2. Based on common application of AC power source,switched frequency placed on 50Hz-60Hz would be acceptable.

However, considering nature characteristic of filament, 10KHz or above would be strongly recommended.

#3. The cut-off voltage should be measured under the condition of side-tab ground to F1.

#4. Absolute Maximum Ratings : The value should not be exceeded in any condition.

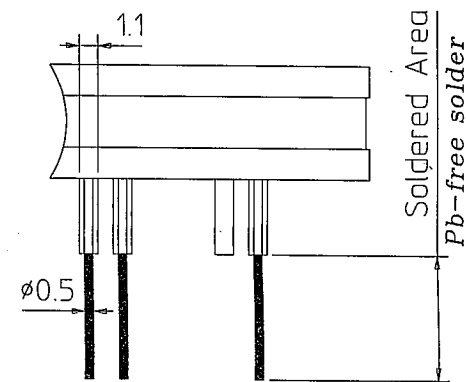
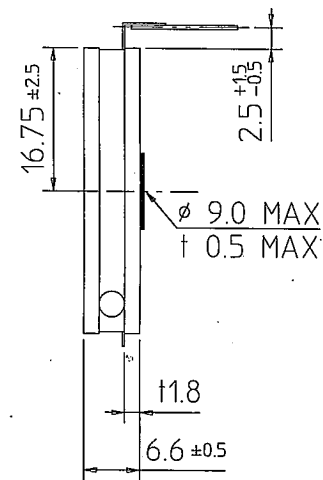
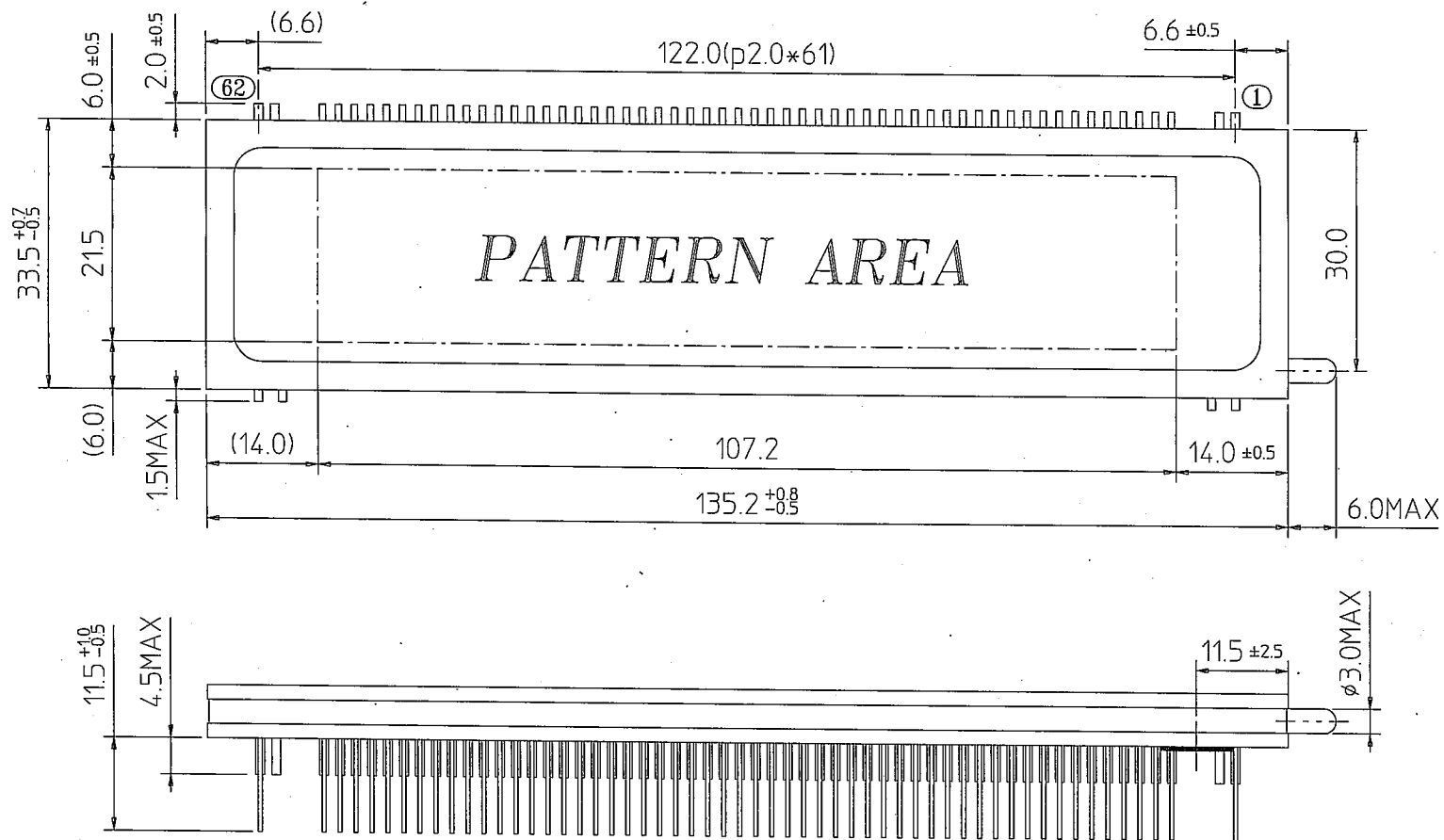
The value is not allowed to be longtime used, or else the VFD may be permanently damaged.

#5. Recommended Operating Condition : Quality can be assured within this condition.

Typical rating is the most optimized value on the life time

#6. All phosphor is Cd-free phosphor.

# OUTER DIMENSIONS



## PIN CONNECTION

PIN NO.	4	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	0	9	8	7	6	5	4	3	2	1
CONNECTION	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	N	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	N	N	N	F

PIN NO.	6	6	6	5	5	5	5	5	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
CONNECTION	F	N	N	N	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P

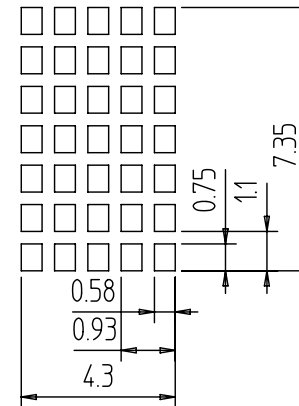
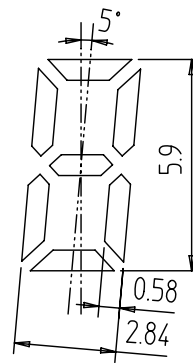
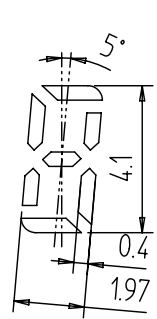
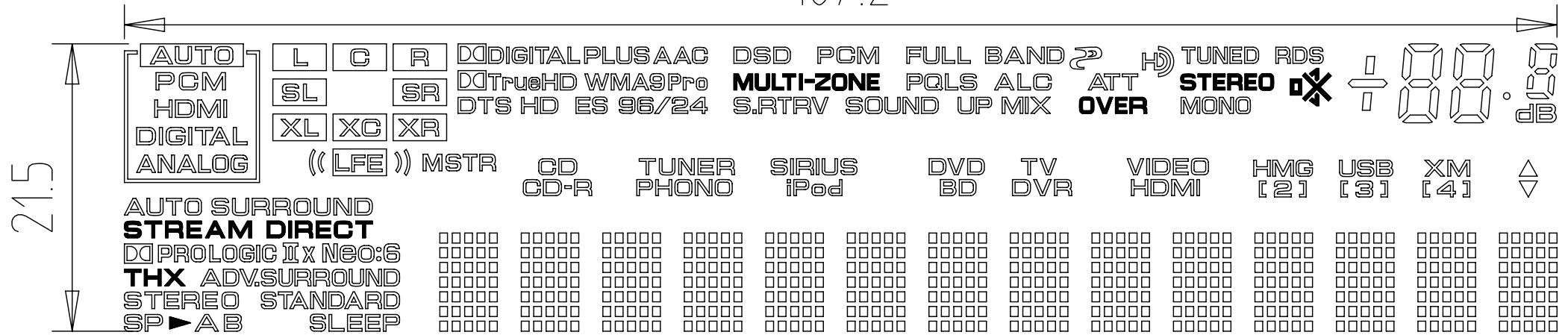
◎ Note ◎

- 1) Fn : Filament pin
- 2) nG : Grid pin
- 3) Pn : Anode pin
- 4) NP : No pin
- 5) NC : No connection pin
- 6) NX : No extended pin

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 Rev. (2) 26-Dec-2012

# PATTERN DETAILS

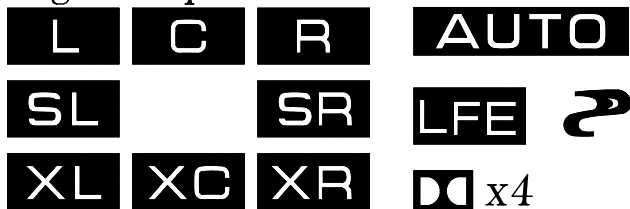
107.2



◎ Color of Illumination ◎

- Cd-free Reddish Orange (Cd-free Rsh.0..  $x=0.62, y=0.37$ ) --- Hatched Patterns.
- Green (G.  $x=0.250, y=0.439$ ) ----- Others.

◎ Negative patterns.

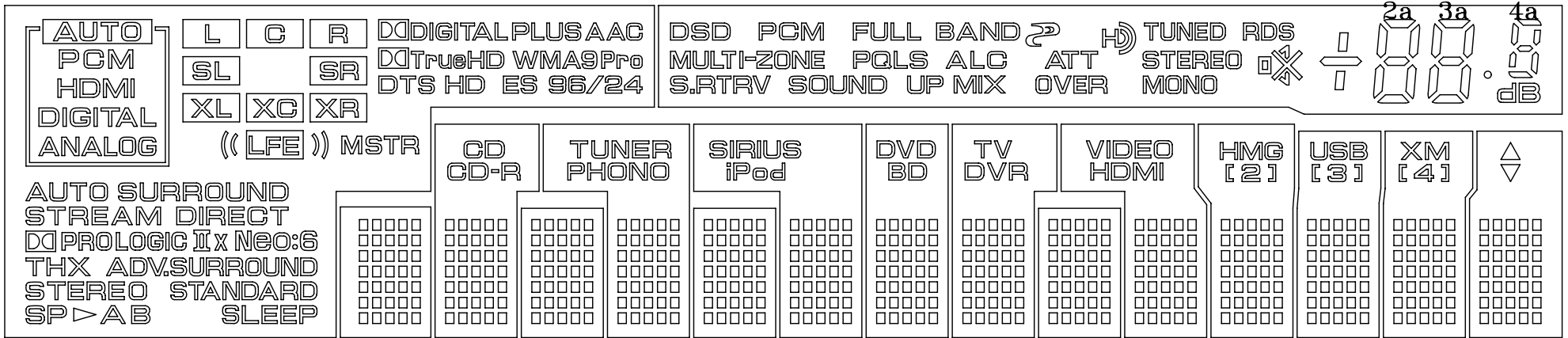


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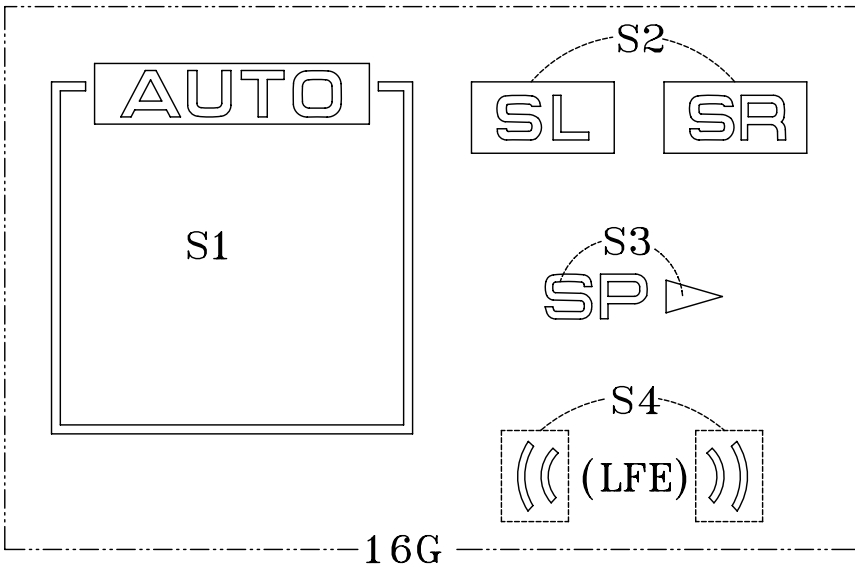
# GRID ASSIGNMENT

16G

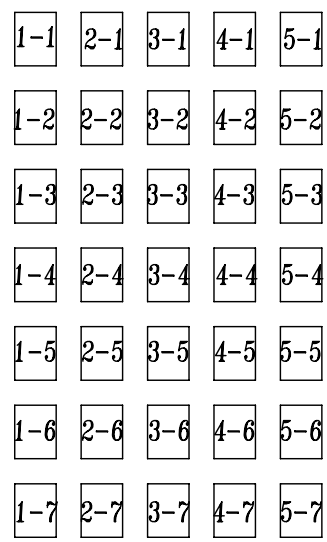
15G



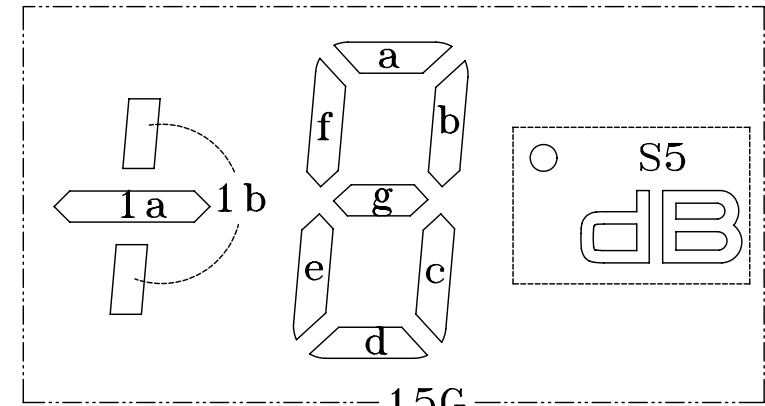
14G 13G 12G 11G 10G 9G 8G 7G 6G 5G 4G 3G 2G 1G



16G



(14G-1G)



15G

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# ANODE CONNECTION

	16G	15G	14G	13G	12G	11G	10G	9G	8G	7G	6G	5G	4G	3G	2G	1G
P1	SLEEP	4g	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7	5-7
P2	B	4e,4b	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7	4-7
P3	A	S5,4d,4c,4a,4f	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7	3-7
P4	S3	RDS	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7	2-7
P5	STANDARD	3a	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7	1-7
P6	STEREO	3b	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6	5-6
P7	ADV.SURROUND	3f	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6	4-6
P8	THX	3g	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6	3-6
P9	Neo:6	3c	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6	2-6
P10	X	3e	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6	1-6
P11	DOLBY PROLOGIC II	3d	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5	5-5
P12	STREAM DIRECT	2a	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5	4-5
P13	ANALOG	2b	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5
P14	DIGITAL	2f	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5
P15	AUTO SURROUND	2g	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5
P16	HDMI	2c	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4	5-4
P17	PCM	2e	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4	4-4
P18	S1	2d	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4	3-4
P19	S4	1b	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4	2-4
P20	LFE	1a	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4	1-4
P21	L	⊗	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3	5-3
P22	C	MONO	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3	4-3
P23	R	STEREO	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3	3-3
P24	S2	TUNED	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
P25	XL	OVER	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3	1-3
P26	XC	ATT	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2	5-2
P27	XR	Ⓜ	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2	4-2
P28	MSTR	Ⓜ	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2	3-2
P29	DIGITAL	UP MIX	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2	2-2
P30	DTrueHD	ALC	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
P31	DTS	FULL BAND	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1
P32	HD	SOUND	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1	4-1
P33	PLUS	PQLS	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1	3-1
P34	WMA9Pro	S.RTRV	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1	2-1
P35	ES	MULTI-ZONE	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1	1-1
P36	AAC	PCM		CD-R		PHONO		iPod	BD	DVR		HDMI	[2]	[3]	[4]	▽
P37	96/24	DSD		CD		TUNER		SIRIUS	DVD	TV		VIDEO	HMG	USB	XM	△

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