Appendix A
Related Publications

Journals

1) M. Varman, H. H. Masjuki, T. M. I. Mahlia. "Emission mitigation from implementation of Minimum Energy Performance Standard (MEPS) for TVs in Malaysia" *Journal of Clean Technologies and Environmental Policy*, Springer-Verlag. Vol. 6, 2004, pp. 282-287.
2) M. Varman, H. H. Masjuki, T. M. I. Mahlia. "Electricity savings from implementation of minimum energy efficiency standard for TVs in Malaysia" *Energy and Buildings* 2004. **In Press.**
3) M. Varman, H. H. Masjuki, T. M. I. Mahlia. "Method for calculating annual energy efficiency improvement of TV sets" *Energy Policy* 2004. **Provisionally Accepted.**

Conferences

1) M. Varman, H. H. Masjuki, T. M. I. Mahlia, Potential Electricity Savings by Implementing Minimum Energy Efficiency Standard for TV Sets in Malaysia. National Symposium on Science and Technology 2003. **Poster Presentation.** Sungai Besi.
2) M. Varman, H. H. Masjuki, T. M. I. Mahlia, A Review on Energy Test Procedure Development for TV Sets, 2nd Technical Postgraduate Symposium 2003 (TECHPOS'03), **Oral Presentation**. Petaling Jaya.

Appendix B

Questionnaires and Survey Data

B.1. Questionnaire

RESIDENTIAL TELEVISION USAGE SURVEY IN MALAYSIAN HOUSEHOLD

NAME OF ASSISTANT :_____

DATE :_____

STARTING TIME :_____

FINISHING TIME :_____

Check List :

1. Complete ☐

2. Uncompleted ☐

Respondents nationality :

1. Malaysian ☐

2. Non Malaysian ☐

No. of people in the house : ☐

No. of TV in the house : ☐

DEPARTMENT OF MECHANICAL ENGINEERING
FACULTY OF ENGINEERING, UNIVERSITY OF MALAYA
50603 KUALA LUMPUR
2002

A RESIDENTIAL MAIN TELEVISION SET DATA (refer TV rear position)

a) Brand _____

b) Model Number (e.g. MP143FE) _____

c) Type (color or black and white) _____

d) Year of Manufacture _____

e) Made/Manufactured in _____

f) Remote Control (yes or no) _____

g) Size (inch) _____

h) Scan Rate (e.g. 50Hz, 100Hz) _____

i) Permissible Power (Watt, e.g. 60W)_____

j) Screen Format (4:3 for conventional TV or 16:9 for wide screen TV) _____

k) Working Voltage Range (e.g. 180-240V)_____

l) Purchase Price _____

B QUESTIONS (MAIN TV)

1) When did you buy your TV? (Year) _____

2) How many hours do you spend time watching broadcast television on the main TV daily? _____Hours/day

3) How many hours do you spend time watching VIDEO / VCD / DVD on the main TV weekly _____Hours/week and daily? (*Hours / week ÷ 7 = Avg.Hours / day*) _____Hours/day

4) How many hours do you spend time playing video_____Hours/week games on the main TV weekly and daily? _____Hours/day

5) How many hours do you spend time logging on the_____Hours/week internet using the main TV (Web-TV) and daily? _____Hours/day

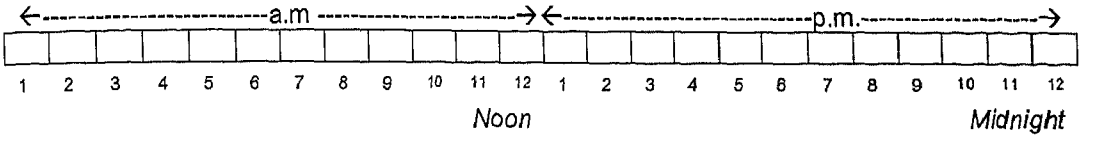
6) Total number of hours, main TV on active mode (on mode) daily? [(6) = (2) + (3) + (4) + (5)] _____Hours/day

7) Total number of hours, main TV on standby mode daily? (attributed to remote control unit) _____Hours/day

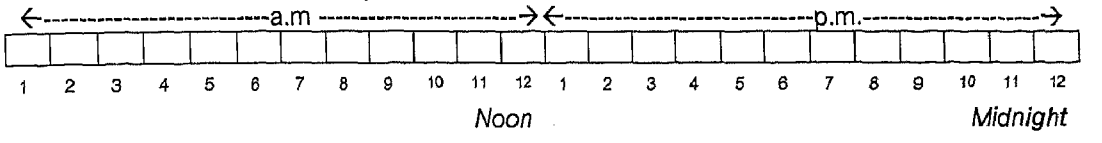
8) Total number of hours, main TV on off mode daily? [(6) + (7) + (8) = 24 Hours] _____Hours/day

9) When do you use your TV?

a Week days



b Weekends/Public holiday



C QUESTIONS (SECOND & THIRD TV)

1) Total number of hours, your second TV on active mode daily? _____Hours/day

2) Total number of hours, your second TV on standby mode daily? _____Hours/day

3) For which activity do you use your 2nd TV? (please tick) BroadcastTV[ ] Video Games[ ] VCD/DVD[ ] Web-TV[ ]

4) Total number of hours, your third TV on active mode daily? _____Hours/day

5) Total number of hours, your third TV on standby mode daily? _____Hours/day

6) For which activity do you use your 3rd TV? (please tick) BroadcastTV[ ] Video Games[ ] VCD/DVD[ ] Web-TV[ ]

D RESPONDENTS

Address:_____

Tel. No.:_____

Suggestions:_____

B.2. Household and market survey data

i) Collection of on-mode power consumption data

Manufactured	Brand	Model	Size (inch)	On-mode Power (W)
2000	Panasonic	TC-14S55K	14	72
2000	Panasonic	TC-14S77K	14	75
2000	Panasonic	TC-21S55K	21	92
2000	Panasonic	TC-21S77K	21	98
2000	Panasonic	TC-20S35K	20	82
2000	Panasonic	TC-21P22K	21	125
2000	Panasonic	TC-25P22K	25	165
2000	Panasonic	TC-2966	29	180
2000	Panasonic	TC-2988	29	180
2000	Panasonic	TC-29P22K	29	180
2000	Panasonic	TX-33P100X	33	219
2000	Panasonic	TX-33P25K	33	173
2000	Panasonic	TC-42PD1F	42	380
2000	Panasonic	TX-51P100H	51	265
2000	Panasonic	TX-43P15H	43	188
2000	Panasonic	TX-29P100X	29	191
2003	Grundig	MF 72-430 DOLBY	29	135
2003	Grundig	STF 55-3232/7	21	60
2003	Grundig	MFW 82-710/9	32	173
2003	Grundig	MFW 82-720/9	32	191
2003	Grundig	MFW 92-6110/9	36	160
2003	Grundig	MFW 82-730/9	32	140
2003	Grundig	MF 72-5310/8	29	110
2003	Grundig	MF 72-5301/8	29	74
2003	Grundig	ST 70-2310	28	105
2003	Grundig	ST 70-2104	28	74
2003	Grundig	STF 72-3232/7	29	60
2003	Grundig	ST 70-2305	28	74
2003	Grundig	ST 70-2305	28	74
2003	Grundig	ST 55-908	21	65
2003	Grundig	ST 55-3202/7	21	60
2003	Grundig	38-9210 TOP	15	45
2003	Grundig	P 37-4204 TOP	14	40
2003	Grundig	P 37-4101/12 MV/SAT	14	45
2003	Grundig	P 37-4101/12 MV	14	35
2003	Grundig	P 37-4201 Top	14	40
2003	Grundig	P 37-2201	14	40
2003	Grundig	MW 82-150/8 DOLBY	32	151
2003	Grundig	MW 82-3112 MV/DOLBY	32	151
2003	Grundig	MW 70-150/8 DOLBY	28	105
2003	Grundig	MF 55-9101 DOLBY	21	60
2003	Grundig	M 55-420/8 DOLBY	21	85
2003	Grundig	ST 55-4105 DOLBY	21	70
2003	Grundig	ST 55-854 DOLBY	21	65
2003	Grundig	T 55-4201 TOP	21	50

2003	Grundig	T 51-4201 TOP	20	50
2003	Grundig	MF 84-6110/8 DOLBY	33	120
2003	Grundig	MF 72-3110/8 DOLBY	29	115
2003	Grundig	MF 72-9110/8 DOLBY	29	115
2003	Grundig	M 72-2110 DOLBY	29	115
2003	Grundig	M 70-3110 DOLBY	28	115
2003	Grundig	M 63-420/8 DOLBY	25	105
2003	Grundig	PW 110-520/9 PALPLUS	42	350
2003	Grundig	MFW 102-6110 MV/AC 3	40	220
2003	Grundig	MFW 82-6211/9 DVD	32	125
2003	Grundig	MFW 82-6210/9 DOLBY	32	115
2003	Grundig	MFW 82-530/9 DVD	32	170
2003	Grundig	MFW 82-530/9 DPL	32	160
2003	Grundig	MFW 82-430/8 DOLBY	32	105
2003	Grundig	MFW 82-3110/MV DOLBY	32	105
2003	Grundig	MFW 70-3210/8 DOLBY	28	115
2003	Grundig	M 84-212/8 DOLBY	33	155
2003	Grundig	ST 84-2202 NIC/DOLBY	33	105
2003	Grundig	ST 70-300 DOLBY	28	105
2003	Grundig	ST 70-284 DOLBY	28	105
2003	Grundig	ST 70-5101 DOLBY	28	74
2003	Grundig	ST 63-300 DOLBY	25	95
2003	Grundig	ST 63-2103 DOLBY	25	74
2003	Grundig	LCD 51-9310	20	40
2002	Panasonic	TC-29PS70K	29	148
2002	Panasonic	TX-21PS78K	21	116
2002	Panasonic	TX-21PS70K	21	99
2002	Panasonic	TX-29P88K	29	158
2002	Panasonic	TX-29P80K	29	158
2002	Panasonic	TX-25P86K	25	138
2002	Panasonic	TC-25P80K	25	138
2002	Panasonic	TX-29P150K	29	197
2002	Panasonic	TX-21PM12K	21	81
2002	Panasonic	TC-21PM10K	21	81
2002	Panasonic	TX-34P150K	34	204
2002	Panasonic	TC-21PM30K	21	86
2002	Panasonic	TC-15PM10K	15	69
2002	Panasonic	TC-15PM30K	15	69
2002	Panasonic	TH50PHW5	50	495
2002	Panasonic	TH42PHW5	42	375
2002	Panasonic	TH42PW5	42	295
2002	Panasonic	TH37PW5	37	225
2002	Pensonic	PCT-211	21	175
2002	Pensonic	PCT-291	29	105
2002	Pioneer	PDP-433MXE	43	298
2002	Pioneer	PDP-503MXE	50	380
2002	Hitachi	CMP4121HD	42	360
2002	Pioneer	PDP-503HDG	50	411
2002	Pioneer	PDP-433HDG	43	359
2002	meck	TF1418II	14	60
2001	Sony	KV-T21MF1	21	108

1997	Philips		21	75
1999	Toshiba	TC-29P20X	29	120
1996	Singer	9607346	21	96
1996	Sharp	21H-SC	21	88
1999	Panasonic	TC-2021K	21	98
2000	Sony	KV-G21P2S	21	110
2000	Singer	TVR-9600	20	87
2002	Sanyo	CA14KX2	14	52
1999	Sharp	N/A	21	88
2001	Panasonic	N/A	14	74
1998	Panasonic	N/A	21	76
2002	meck	N/A	29	130
2001	Panasonic	N/A	21	82
1999	Panasonic	N/A	14	72
1996	Aiwa	N/A	20	85
N/A	Singer	N/A	16	65
N/A	Singer	N/A	16	74
N/A	Singer	962	16	79
1997	Panasonic	N/A	21	82
1993	Sony	KV-2184GET	21	103
1988	Sony	KV 21846E	21	98
1998	Panasonic	TX-21ST20K	21	82
1994	Philips	21GX3765/50TM	21	75
1994	Sony	KV-X21M61	21	108
1996	Sony	KV-XF29M65	29	176
1999	HesStar	HT 149	14	55
1994	Panasonic	TC-21EIK	21	103
1997	Hitachi	CMT2589M	25	135
1994	Panasonic	TCPG21VM	21	103
1998	Daewoo	DTC-29G4	29	145
1995	Mitsubishi	CT 2011P	21	86
1998	Hitachi	CPT 2579M	25	125
1999	Sharp	C1401M	14	55
1984	National	TC-430M	14	55
1988	Sony	KV1404GE	14	72
N/A	Hitachi	C2117DS	20	88
1995	Sony	T29MF85	29	148
1992	Sanyo	CAP2930MK	29	120
1998	Toshiba	ABO123DE	14	60
1990	Sony	KV218CR	21	98
1995	MEC	CPT251KT	21	130
1992	Sony	KV 2153GET	21	130
N/A	Toshiba	AME236 PF	19	60
N/A	Sony	MH 8526	24	80
N/A	Toshiba	CT-9851	24	80
N/A	Philips	K3182AC	26	80
N/A	Samsung	16J2	17	98
N/A	Setron	CT513MP	17	56
N/A	Sony	CA 481PO	24	110
1994	Panasonic	TC-PT16V	14	74
1999	JVC	AV29LS	29	120

2001	JVC	HV29LPZ	29	120
1997	Toshiba	14N1XE	14	60
1993	Toshiba	207E3E	20	61
1997	Philips	29GX1891/50MS	29	140
1997	Panasonic	TC-21E1K	21	103
1999	Elba	ETV 2921	29	170
1983	Toshiba	21A3E	21	60
2001	Thomson	29DF25ES	29	120
1998	Toshiba	TSB-C21GERE	21	70
1998	RCA	21TBOB	21	60
N/A	Panasonic	TC-PG21	19	120
1981	Sharp	SCE-1638	21	60
N/A	Samsung	CS20S5ST	20	80
N/A	Toshiba	34AX9UE	34	120
1997	Samsung	CS-21A85	14	65
1996	Philips	RC7954	21	75
1990	National	TC-21AGK	21	82
2000	Sanyo	CA20SV1	20	80
2002	Panasonic	TC-21PS70K	21	99
1992	Sony	KV2964GNT	29	180
1994	Sony	2185GET	21	105
2002	Philips	29PT2252/68R	29	120
1995	Mitsubishi	CT25AB1(M)	29	160
1996	Samsung	CS-7277PF	29	180
2001	Toshiba	14D2RE	14	55
1994	Sharp	SV-2042M1	21	95
1992	Panasonic	TX-21ETIK	21	108
1990	Panasonic	TC-PG14	14	65
1990	HesStar	HT-20M58	14	80
1994	Philips	20GX8350/50M	21	70
2001	Sharp	29C-FX5	29	170
2001	Khind	TV-25A22	25	110
1995	Panasonic	TC-PG20N	21	90
1995	Sony	KV-2184GET	21	103
1995	JVC	AV-K25MX2	25	95
1996	National	TC-20TGL	21	78
N/A	Sharp	12P-27E	16	45
1997	Toshiba	2955DE	29	125
1998	Sharp	29KN1S	29	165
1996	Sony	KV-R21P1	21	125
1998	Toshiba	2955DE	29	125
1991	Sony	KV-2115GE	21	105
1998	Sony	KV-J25MN91	25	194
1990	Sony	KV-2165MT	21	125
1997	Goldstar	CF-29C377	29	160
1996	Sony	KV-1485GET	14	88
1992	Sony	KV-2185GET	21	105
1987	Toshiba	207E7E	20	71
1987	National	TC-20J	20	93
2001	Samsung	CS-29A747	29	170
1983	Toshiba	C-1831A	20	65

2001	Sharp	29B-S10M	29	155
1987	Hitachi	CPT 2022	20	62
1997	HesStar	HT-20MSA	21	80
1997	Panasonic	TC-20Z1K	21	98
1992	Sony	KV-1404GE	14	72
2000	Sony	KV-XJ29M50	29	170
N/A	Sony	KV-G21P21S	20	110
1993	Sony	KV-G21P2S	21	110
N/A	Panasonic	TC-PT16V	16	74
N/A	Sony	XF34M65	34	180
1996	Panasonic	TC 2933	29	165
1997	Panasonic	TC-PG14	14	65
1986	Singer	938	14	53
2002	Panasonic	TC 21K530Q	21	91
1998	Singer	TVR 9241	14	59
1998	Sharp	14GTM	14	65
1999	TAG Vision	TG 2188-KTV	21	70
1998	National	TC-14AG2	14	57
2002	Sanyo	CA29KX2	29	113
1997	Panasonic	TC-20L30K	20	98
1999	Sony	KV-HAZIM50	21	110
N/A	Sony	KV-2553MT	25	160
2001	Philips	21PT3942/68R	21	75
2000	JVC	AV-21PM	21	95
2002	Aiwa	TV-C2121KER	21	75
1999	Singer	TVR-9871	21	100
1999	ECE	EIT2121	21	70
1999	LG	CA-21K40	21	85
N/A	Toshiba	67R8E2	16	55
N/A	National	TC-18PCK	16	59
N/A	Panasonic	TC-10L20K	18	80
N/A	NEC	PS-2100	16	86
2000	Panasonic	TC 20S35K	20	82
2002	Sanyo	CA14KX2	14	52
2000	JVC	AV-K29MX3	29	190
2000	JVC	AV-P29X	29	200
1989	Mitsubishi	N/A	20	83
1980	National	TC-21AFK	21	83
1988	National	TC-G20	20	90
2000	Aiwa	AW-2900SF	29	130
1996	Sony	KV-R21P1	21	110
2000	Sharp	29 RN2	29	180
1998	Sony	KV-G21P2S	21	110
1998	Sony	KV-J29MFIS	29	180
1996	Sony	KV-XG29M61	29	180
1998	Sony	KV-J25MFIS	25	150
N/A	Khind	TV-34A2	34	150
N/A	Samsung	CB-5027X	20	83
1993	Samsung	N/A	21	110
2002	Sharp	20A2-A	20	87
2001	Samsung	CS21K3ST	21	65

1999	Audio Matic	AM46ZE	21	69
1986	Hitachi	N/A	14	68
1997	Sony	KE1824GET	21	60
1996	Toshiba	1460RE	14	55
1995	JVC	C-21TMA	21	80
1997	Samsung	CS-53992	21	90
1997	Samsung	CV 51688	21	60
1995	Sony	N/A	14	80
1995	Telestar	TS 9721	21	85
1992	Hitachi	CPT2579M	25	125
1995	Panasonic	TC-21L20K	21	85
1999	Panasonic	TH-14RV	14	85
N/A	LG	N/A	16	85
N/A	MEC	ME193K5	17	68
N/A	LG	CA-21K40	17	80
N/A	LG	CA-21K40A	17	85
N/A	Panasonic	TC-20520K	17	76
1999	Panasonic	TH-14RF1	14	80
1999	LG	CA-21K50	15	85
1995	ECE	N/A	14	60
2003	Telestar	TS 29FZ	29	130
2003	JVC	AV 21EM	21	68
2003	Toshiba	14N1XE	14	60
2003	Toshiba	21V1ES	21	76
2003	Toshiba	29A3ES	29	125
2003	Toshiba	21A3ES	21	105
2003	Toshiba	29AZ7E	29	140
2003	Toshiba	29AZ7DE	29	140
2003	Toshiba	21D3XE	21	105
2003	Samsung	CS-14H2Z	14	65
2003	Samsung	CS-14H2T	14	65
2003	Samsung	CS-29D8NT	29	120
2003	Samsung	CS-20H2T	20	78
2003	Samsung	CS-20H2Z	20	78
2003	Samsung	CS-20S5ST	20	57
2003	Toshiba	14N1XES	14	60
2003	Toshiba	21V1ES	21	76
2003	Toshiba	21A3E	21	80
2003	Toshiba	21D7DXE	21	125
2003	Toshiba	61A9UE	61	260
2003	Toshiba	34AX9UE	34	200
2003	Toshiba	35WP26P	35	250
2003	Toshiba	42WP26	42	280
2003	Toshiba	50XP26H	50	595
2003	Toshiba	29AZ8UE	29	195
2003	JVC	AV-29RX	29	137
2003	JVC	AV-25LX3	25	90
2003	JVC	AV-21LT3	21	65
2003	JVC	AV-21PM	21	74
2003	JVC	HV-L29PRO	29	170
2003	JVC	AV-29WX3 / 29WS3	29	116

2003	JVC	AV-29LX2	29	108
2003	JVC	AV-29LX1	29	108
N/A	JVC	HV-34LZ	34	153
N/A	JVC	PD-35DX	35	373
N/A	JVC	AV-5000	50	219
N/A	JVC	HV-L34PRO	34	170
N/A	JVC	AV-34LS	34	108
2003	Samsung	LS15S13C	15	43
2003	Samsung	LW40A13WD	40	220
2003	Samsung	LS-22A13W	22	120
2003	Samsung	LW29A13WD	29	170
2003	Samsung	SP-42W5HP	42	200
2003	Samsung	SP-43T7HF	43	200
2003	Samsung	SP-54J7PF	54	235
2003	Samsung	SP-54J8HF	54	235
2003	Samsung	SP-48T6HP	48	200
2003	Samsung	SP-55W3HF	55	235
2003	Samsung	SP-47W3HF	47	235
2003	Samsung	SP-43T6HP	43	200
2003	Hitachi	C29-R30SP	29	152
2003	Hitachi	C14-RM50	14	68
2003	Hitachi	C21-RF39S	21	94
2003	Hitachi	C21-RF50S	21	100
2003	Hitachi	C15-F200Q	15	79
2003	Hitachi	C21-F200	21	90
2003	Hitachi	C29-F500DR	29	187
2003	Hitachi	C29-F300B	29	138
2003	Hitachi	PD32-A3000	32	260
2003	Hitachi	PD42-A3000	42	335
2003	Hitachi	C43-FD2000	43	235
2003	JVC	AV-21Q3	21	68
2003	JVC	AV-21DTT2	21	60
2003	JVC	AV-F2983	29	120
2003	JVC	AV-21DM10	21	68
2003	JVC	AV-14F3	14	47
2003	Akira	LTV-1580AN	15	30
2003	Akira	LTV-1880AN	18	50
2003	Akira	ELT201A	20	58
2003	Akira	SV-4201	42	340
2003	Akira	SV-4201H	42	340
2003	Akira	EPM500	50	450
2003	Akira	EPM600	60	700
2003	ViewSonic	N1500TV	15	60
2003	ViewSonic	N1800TV	18	60
2003	ViewSonic	VT550	15	36
2003	ViewSonic	VPW425	42	370
2003	ViewSonic	VPW450HD	42	340
2003	ViewSonic	VPW505	50	370
2003	Sanyo	DS32920	32	100
2003	Sanyo	PDP-32H1W	32	240
2003	Sanyo	PDP-42H1W	42	350

2003	Sanyo	DS27930	27	95
2003	Sanyo	DS27910	27	112
2003	Sanyo	DS20930	20	60
2003	Sanyo	DS32830H	32	160
2003	Sanyo	DS31820	31	89
2003	Sanyo	DS27830	27	86
2003	Sanyo	DS35520	35	105.8
2003	Sanyo	DS35510	35	107
2003	Sanyo	DS27530	27	86
2003	Sanyo	DS25520	25	74
2003	Sanyo	DS25500	25	60
2003	Sanyo	DS19500	19	58
2003	Sanyo	DS25320	25	74
2003	Sanyo	DS25390	25	88
2003	Sanyo	DS19330	19	58
2003	Sanyo	DS19310	19	68
2003	Sanyo	DS13330	13	45
2003	Sanyo	DS13320	13	45
2003	SAMPO	PME-50X6	50	470
2003	SAMPO	PME-42S6	42	340
2003	SAMPO	PME-42X6	42	340
2003	Sharp	LC-13B2UA	13	33.5
2003	Sharp	LC-20B2UA	20	65
2003	Sharp	PZ-43HV2U	43	320
2003	Sharp	PZ-50HV2U	50	371
2003	Sharp	61RWP5H	61	290
2003	Sharp	55RWP5H	55	290
2003	Sharp	61RWP4H	61	290
2003	Sharp	55RWP4H	55	290
2002	Daewoo	DSP-5000WM	50	450
2002	Daewoo	DSP-4280WMW	42	320
2003	Mitsubishi	PD-5010	50	480
2003	Mitsubishi	VS-50111	50	240
2003	Mitsubishi	VS-60111	60	240
2003	Philips	55PP9352	55	180
2003	Philips	55PP9502	55	180
2003	Philips	60PP9352	60	180
2003	Philips	60PP9502	60	180
2003	Elba	ETV-2913	29	130
2003	Elba	ETV-2113	21	78
2003	Elba	ETV-2988	29	180
2003	Elba	ETV-2166	21	85
2003	Panasonic	TX-25S100K	25	160
2003	Panasonic	TC-25S90K	25	150
2003	Sony	KV-J21MN21	21	120
2003	Sony	KV-XF21M65	21	108
2002	MTT	N/A	29	150
2002	Fujitech	N/A	21	75
2002	MTV	N/A	14	75
2003	Sharp	29CFX1	29	160
2003	Sharp	29CFX5	29	170

2003	Panasonic	TX-29P180K	29	197
2003	JVC	AV42PD20ES	42	280
2003	JVC	AV32A25EKS	32	127
2003	JVC	AV28A25EKS	28	125
2003	JVC	AV32T25EKS	32	120
2003	JVC	AV28T25EKS	28	120
2003	JVC	AV32L5EKGY	32	140
2003	JVC	AV28S2EKGR	28	121
2003	JVC	AV28CT1EKS	28	122
2003	JVC	AV24WT5EKS	24	92
2003	Sony	KLV30XBR900	30	150
2003	Akai	CT-A42AR7A	42	340
2003	Fujitsu	PDS-4229	42	370
2003	Panasonic	TH-42PHD5UY	42	375
2003	Panasonic	TH-50PHD5UY	50	495
2003	Panasonic	TH-42PWD5UY	42	295
2003	Panasonic	TH-37PWD5UZ	37	225
2003	Sharp	LC-13B2UA	13	41
2003	Sharp	LC-15B2UA	15	41
2003	Sharp	LC-20B2UA	20	65
2003	Sharp	LC-30HV4U	30	114
2003	Sharp	LC-37HV4U	37	157
2003	NEC	LCD4000	40	235
2003	Panasonic	TX22LT2	22	69
2003	Panasonic	TX15LT2	15	51
2003	Solarism	T150 TFT	15	48
2003	Totevision	LCD- 1702VT	22	55
2003	Mirage	DDP-4200	42	220
2003	Fujitsu	SV-4201	42	340
2003	Decktron	DLT-300W	30	154
2003	VTEK	VPM321W-3-02	32	240
2003	VTEK	VPM421W-5-02	42	340
2003	Pure Vision	PDP-503HDE	50	396
2003	Pure Vision	PDP-433HDE	43	360
2003	Salora	32MCW320	32	140
2003	Salora	32MCW310	32	140
2003	Salora	28MCW310	28	120
2003	Salora	32MCW300	32	140
2003	Salora	28MCW300	28	120
2003	Salora	29MC300	29	120
2003	Salora	28MC300	28	100
2003	Bang & Olufsen	BeoVision 1	25	81
2003	Bang & Olufsen	BeoVision 3	32	134
2003	Bang & Olufsen	BeoVision MX 8000	28	81
2003	Bang & Olufsen	BeoVision MX4200	21	56
2003	Bang & Olufsen	BeoVision Avant 32"	32	134
2003	Bang & Olufsen	BeoVision Avant	32	115
2003	Bang & Olufsen	BeoVision 5	42	282
2003	Loewe	Aconda 93102 ZW Classic	40	155
2003	Loewe	Aconda 9581 ZWH Select	32	155
2003	Loewe	Aconda 9581 ZW Select	32	155

2003	Loewe	Aconda 9372 ZP Classic	29	155
2003	Loewe	Aconda 9281 ZW Living	32	155
2003	Loewe	Arcada 8755 Z	21	100
2003	Loewe	Arcada 8772 ZP	29	145
2003	Loewe	Vitros 6370 ZW	28	130
2003	Loewe	Vitros 6381 ZW	32	155
2003	Loewe	Vitros 6372 ZP	29	135
2003	Loewe	Mimo 32	32	135
2003	Loewe	Mimo 29	29	130
2003	Loewe	Mimo 15	15	44
2003	Loewe	Xelos 5381 ZW	32	145
2003	Loewe	Xelos 5270 ZW	28	125
2003	Loewe	Xelos 5261 ZW	24	115
2003	Loewe	Calida 5784 ZP	33	135
2003	Loewe	Calida 5772 ZP	29	130
2003	Loewe	Calida 5763 Z	25	125
2003	Loewe	Calida 5755 Z	21	75
2003	Loewe	Planus 4781 ZWH	32	150
2003	Loewe	Planus 4781 ZW	32	150
2003	Loewe	Planus 4672 ZP	29	130
2003	Loewe	Planus 4670 ZW	28	130
2003	Loewe	Planus 4663 Z	25	125
2003	Loewe	Aventos 3981 ZW	32	135
2003	Loewe	Aventos 3972 ZP	28	130
2003	Loewe	Aventos 3970 ZW	28	130
2003	Loewe	Aventos 3781 ZW Living	32	135
2003	Loewe	Aventos 3772 Z Living	28	130
2003	Loewe	Cantus 3870 ZW	28	125
2003	Loewe	Cantus 3872 ZP	28	125
2003	Loewe	Profil 3572 Z	29	125
2003	Loewe	Profil 3570 Z	28	130
2003	Loewe	Profil 3472	28	90
2003	Loewe	Profil 3470	28	100
2003	Loewe	Contur 1670 Z	28	130
2003	Loewe	Contur 1663 Z	25	130
2003	Philips	37PF9965	37	300
2003	Philips	42PF9955	42	320
2003	Philips	42PF9965	42	380
2003	Philips	50PF9965	50	595
2003	Philips	20PF7835	20	70
2003	Philips	20PF9925	20	70
2003	Philips	23PF9945	23	100
2003	Philips	30PF9975	30	160
2003	Philips	32PF9965	32	280
2003	Philips	14PT1356	14	38
2003	Philips	14PT1556	14	38
2003	Philips	14PT6107	14	50
2003	Philips	21PT4457	21	50
2003	Philips	21PT5408	21	52
2003	Philips	21PT5606	21	52
2003	Philips	25PT4426	25	59

2003	Philips	25PT4457	25	59
2003	Philips	25PT5007	25	59
2003	Philips	25PT7106	25	104
2003	Philips	25PT7308	25	104
2003	Philips	28PT4426	28	66
2003	Philips	28PT4457	28	66
2003	Philips	28PT5007	28	66
2003	Philips	28PT7106	28	104
			Average	136-W

ii) Collection of standby-mode power consumption data

Manufactured	Brand	Model	Size (inch)	Standby-mode Power (W)
2003	Grunding	MFW 82-710/9	32	4
2003	Grunding	MFW 82-720/9	32	4
2003	Grunding	MFW 92-6110/9	36	2
2003	Grunding	MFW 82-730/9	32	2
2003	Grunding	MF 72-5310/8	29	1
2003	Grunding	MF 72-5301/8	29	4
2003	Grunding	ST 70-2310	28	1
2003	Grunding	ST 70-2104	28	4
2003	Grunding	STF 72-3232/7	29	5
2003	Grunding	ST 70-2305	28	4
2003	Grunding	ST 70-2305	28	4
2003	Grunding	ST 55-908	21	5
2003	Grunding	STF 55-3232/7	21	5
2003	Grunding	ST 55-3202/7	21	5
2003	Grunding	38-9210 TOP	15	3
2003	Grunding	P 37-4204 TOP	14	4
2003	Grunding	P 37-4101/12 MV/SAT	14	3
2003	Grunding	P 37-4101/12 MV	14	2
2003	Grunding	P 37-4201 Top	14	4
2003	Grunding	P 37-2201	14	4
2003	Grunding	MW 82-150/8 DOLBY	32	1
2003	Grunding	MW 82-3112 MV/DOLBY	32	1
2003	Grunding	MW 70-150/8 DOLBY	28	1
2003	Grunding	MF 55-9101 DOLBY	21	4
2003	Grunding	M 55-420/8 DOLBY	21	1
2003	Grunding	ST 55-4105 DOLBY	21	5
2003	Grunding	ST 55-854 DOLBY	21	5
2003	Grunding	T 55-4201 TOP	21	4
2003	Grunding	T 51-4201 TOP	20	4
2003	Grunding	MF 84-6110/8 DOLBY	33	1
2003	Grunding	MF 72-430 DOLBY	29	1
2003	Grunding	MF 72-3110/8 DOLBY	29	1
2003	Grunding	MF 72-9110/8 DOLBY	29	1
2003	Grunding	M 72-2110 DOLBY	29	1
2003	Grunding	M 70-3110 DOLBY	28	1

2003	Grunding	M 63-420/8 DOLBY	25	1
2003	Grunding	PW 110-520/9 PALPLUS	42	2
2003	Grunding	MFW 102-6110 MV/AC 3	40	1.9
2003	Grunding	MFW 82-6211/9 DVD	32	2
2003	Grunding	MFW 82-6210/9 DOLBY	32	1
2003	Grunding	MFW 82-530/9 DVD	32	3
2003	Grunding	MFW 82-530/9 DPL	32	5
2003	Grunding	MFW 82-430/8 DOLBY	32	1
2003	Grunding	MFW 82-3110/MV DOLBY	32	1
2003	Grunding	MFW 70-3210/8 DOLBY	28	1
2003	Grunding	M 84-212/8 DOLBY	33	1
2003	Grunding	ST 84-2202 NIC/DOLBY	33	6
2003	Grunding	ST 70-300 DOLBY	28	1
2003	Grunding	ST 70-284 DOLBY	28	1
2003	Grunding	ST 70-5101 DOLBY	28	5
2003	Grunding	ST 63-300 DOLBY	25	1
2003	Grunding	ST 63-2103 DOLBY	25	4
2003	Grunding	LCD 51-9310	20	1
2002	Pioneer	PDP-433MXE	43	1
2002	Pioneer	PDP-503MXE	50	1.1
2002	Hitachi	CMP4121HD	42	2.5
2003	JVC	PD-35DX	35	2.9
2003	Samsung	LS15S13C	15	1.5
2003	Samsung	LW29A13WD	29	6.5
2003	Samsung	LW40A13WD	40	6.5
2003	Hitachi	C29-F500DR		0.7
2003	Hitachi	C29-F300B	29	0.7
2003	Hitachi	PD32-A3000	32	2
2003	Hitachi	PD42-A3000	42	2
2003	ViewSonic	VPW450HD	42	1
2003	Sharp	PZ-43HV2U	43	0.8
2003	Sharp	PZ-50HV2U	50	0.8
2003	JVC	AV42PD20ES	42	5.5
2003	JVC	AV32A25EKS	32	3
2003	JVC	AV28A25EKS	28	3
2003	JVC	AV32T25EKS	32	3
2003	JVC	AV28T25EKS	28	3
2003	JVC	AV32L5EKGY	32	2.8
2003	JVC	AV28S2EKGR	28	0.8
2003	JVC	AV28CT1EKS	28	0.8
2003	JVC	AV24WT5EKS	24	0.8
2003	Sony	KLV30XBR900	30	1.5
2003	Akai	LM-F30CHSA	30	15
2003	Akai	LM-F20CGSA	20	5
2003	Akai	LM-F17CFSA	17	5
2003	Akai	LM-F15CFSA	15	5
2003	Panasonic	TH-42PHD5UY	42	3
2003	Panasonic	TH-50PHD5UY	50	3
2003	Panasonic	TH-42PWD5UY	42	2.8
2003	Panasonic	TH-37PWD5UZ	37	2.8
2003	Sharp	LC-13B2UA	13	0.5

2003	Sharp	LC-15B2UA	15	0.5
2003	Sharp	LC-20B2UA	20	0.5
2003	NEC	LCD4000	40	5
2003	Panasonic	TX15LT2	15	3
2003	Sharp	61RWP5H	61	0.8
2003	Sharp	55RWP5H	55	0.9
2003	Sharp	61RWP4H	61	0.9
2003	Sharp	55RWP4H	55	1
2003	Philips	55PP9352	55	0.65
2003	Philips	60PP9352	60	0.65
2003	Philips	55PP9502	55	0.65
2003	Philips	60PP9502	60	0.65
2003	Sanyo	DS32920	32	2.4
2003	Pure Vision	PDP-503HDE	50	4
2003	Pure Vision	PDP-433HDE	43	4
2003	Bang & Olufsen	BeoVision 1	25	0.5
2003	Bang & Olufsen	BeoVision 3	32	1.8
2003	Bang & Olufsen	BeoVision MX 8000	28	5
2003	Bang & Olufsen	BeoVision MX4200	21	5
2003	Bang & Olufsen	BeoVision Avant 32"	32	2
2003	Bang & Olufsen	BeoVision Avant	32	3
2003	Bang & Olufsen	BeoVision 5	42	1.8
2001	Sony	KV-T21MF1	21	10
N/A	Sony	KV-1984GE	19	12.6
2002	meck	TF1418 II	14	11.6
2002	Philips	28PW8506	28	0.55
2002	Philips	28PW8806	28	0.34
2002	Philips	32PW9515	32	0.34
2002	Philips	32PW9545	32	0.34
2002	Philips	28PT7106	28	0.55
2002	Philips	28PT7306	28	0.55
2002	Philips	29PT7306	29	0.34
2002	Philips	29PT9006	29	0.34
2002	Philips	24PW8504	24	1
2002	Philips	32PW9566	32	0.34
2002	Philips	32PW9536	32	0.34
2002	Philips	32PW9616	32	0.36
2002	Philips	32PW9576	32	0.34
2002	Philips	32PW8806	32	0.34
2002	Philips	32PW8406	32	0.34
2002	Philips	32PW8206	32	0.34
2002	Philips	32PT9964	32	2
2002	Philips	55PP9501	55	1
2002	Philips	36PW9765	36	0.34
2002	Philips	36PW9525	36	0.34
2002	Philips	32PW8506	32	0.55
2002	Philips	32PW8707	32	0.34
2002	Philips	28PW8707	28	0.34
2002	Philips	32PW9556	32	0.34
2002	Thomson	24WK22E	22	0.5
2002	Thomson	29DJ6824E	27	1

2002	Thomson	21MX17E	20	1
2003	Salora	32MCW320	32	0.5
2003	Salora	32MCW310	32	0.5
2003	Salora	28MCW310	28	0.5
2003	Salora	32MCW300	32	0.5
2003	Salora	28MCW300	28	0.5
2003	Salora	29MC300	29	0.5
2003	Salora	28MC300	28	0.5
2003	JVC	HV-32D25	32	5.5
2003	JVC	PD-42D30S	42	2.9
2003	JVC	AV-32Z25	32	2.6
2003	JVC	AV-28Z25	28	2.6
2003	JVC	AV-32H20S	32	2.6
2003	JVC	AV-28H20S	28	2.6
2003	JVC	AV29BH11S	29	3
2003	JVC	AV29BF11S	29	4
2003	JVC	AV21BF11S	21	4
2003	JVC	AV-42PD20S	42	5.5
2003	JVC	AV-32X25S	32	2.6
2003	JVC	AV-28X25S	28	2.6
2003	JVC	AV-32L2GR	32	2.8
2003	JVC	AV-28L2GR	28	2.8
2003	JVC	AV-28T20S	28	3
2003	JVC	AV-28CH1S	28	2.8
2003	JVC	AV-28CT1S	28	0.8
2003	JVC	AV-24TW5S	24	0.8
2003	JVC	AV-29A10S	29	2.8
2003	JVC	AV-28BH7S	28	2.2
2003	JVC	AV-28BT8S	28	4
2003	JVC	AV-28BD5S	28	3
2003	JVC	AV-25BT6S	25	4
2003	JVC	AV-21BT8S	21	4
2003	JVC	AV-21BD5S	21	3
2003	Loewe	Xelos 5270 ZW	28	5
2003	Loewe	Profil 3472	28	7
2003	Loewe	Profil 3470	28	7
2003	Philips	37PF9965	37	2
2003	Philips	42PF9955	42	3
2003	Philips	42PF9965	42	2
2003	Philips	50PF9965	50	3
2003	Philips	20PF7835	20	1
2003	Philips	20PF9925	20	3
2003	Philips	23PF9945	23	1
2003	Philips	30PF9975	30	2
2003	Philips	32PF9965	32	2
2003	Philips	14PT1356	14	3
2003	Philips	14PT1556	14	3
2003	Philips	14PT6107	14	3
2003	Philips	21PT4457	21	3
2003	Philips	21PT5408	21	1
2003	Philips	21PT5606	21	1

2003	Philips	25PT4426	25	1
2003	Philips	25PT4457	25	1
2003	Philips	25PT5007	25	1
2003	Philips	25PT7106	25	0.55
2003	Philips	25PT7308	25	0.55
2003	Philips	28PT4426	28	1
2003	Philips	28PT4457	28	1
2003	Philips	28PT5007	28	1
2003	Philips	28PT7106	28	0.55
2002	Haier	HTN13G11F	13	2.70
2002	Hitachi	53UWX10BA	53	2.70
2002	Hitachi	61UWX10BA	61	2.70
2002	Hitachi	43GX10B	43	2.10
2002	Hitachi	43UDX10B	43	2.70
2002	Hitachi	53UDX10B	53	2.70
2002	Hitachi	61UDX10B	61	2.70
2002	Hitachi	43UWX10B	43	2.70
2002	Hitachi	53UWX10B	53	2.70
2002	Hitachi	61UWX10B	61	2.70
2002	Hitachi	43FDX10B	43	2.70
2002	Hitachi	43FDX11B	43	2.70
2002	Hitachi	53SWX10B	53	2.80
2002	Hitachi	61SWX10B	61	2.80
2002	Hitachi	61SWX12B	61	2.80
2002	Hitachi	53SWX12B	53	2.80
2002	Hitachi	50DX20B	50	2.70
2002	Hitachi	50FX20B	50	2.70
2002	Hitachi	60FX20B	60	2.70
2002	Hitachi	43FDX15B	43	2.70
2002	Hitachi	43FDX20B	43	2.70
2002	Hitachi	53FDX20B	53	2.70
2002	Hitachi	53SDX20B	53	2.70
2002	Hitachi	53SDX20BB	53	2.70
2002	Memorex	MT1091	9	2.70
2002	Memorex	MT1091	9	2.70
2002	Philips	14PT3685/01	14	2.70
2002	Philips	14PT3685/05	14	2.70
2002	Philips	27FSQ050	29	3.00
2002	Philips	27FSQ060	29	3.00
2002	Philips	32FSQ060	33	3.00
2002	Philips	36FSQ060	37	3.00
2002	Philips	27FSQ085	29	3.00
2002	Philips	32FSQ085	33	3.00
2002	Philips	36FSQ085	37	3.00
2002	Philips	24PW6005	24	3.00
2002	Philips	28PW6005	28	3.00
2002	Philips	32PW6005	32	3.00
2002	Philips	28PW6305	28	3.00
2002	Philips	32PW6305	32	3.00
2002	Philips	29PT5515	29	3.00
2002	Philips	28PW6515	28	3.00

2002	Philips	32PW6515	32	3.00
2002	Philips	PC0119C1	19	2.90
2002	Philips	PC0119C1	19	2.90
2002	Philips	PC0125C1	25	2.90
2002	Philips	PC0127C1	27	2.90
2002	Philips	PCW127C1	27	2.90
2002	Philips	PCW127C1	27	2.90
2002	Samsung	TXH1970	19	2.70
2002	Samsung	TXH1972	19	2.70
2002	Samsung	TXH1973	19	2.70
2002	Samsung	TXH1986	19	2.70
2002	Samsung	TXJ1966	19	2.70
2002	Samsung	TXH1970	19	2.70
2002	Sharp	27K-S100	27	2.70
2002	Sharp	27K-S180	27	2.70
2002	Sharp	27K-S300	27	2.70
2002	Sharp	27K-S400	27	2.70
2002	Sharp	27L-S500	27	2.70
2002	Sharp	27L-S300	27	2.70
2002	Sharp	27L-X2000	27	2.70
2002	Sharp	27N-X2000	27	2.70
2002	Sharp	CN27X200	27	2.70
2002	Sharp	27N-S300	27	2.70
2002	Sharp	CN27S30	27	2.70
2002	Sharp	27R-S50	27	2.80
2002	Sharp	32U-F810	32	2.80
2002	Sharp	32U-S60	32	2.80
2002	Sharp	32U-S50	32	2.80
2002	Sharp	27U-S50	27	2.80
2002	Sharp	32U-F800	32	2.80
2002	Sharp	32U-F500	32	2.80
2002	Sharp	27U-F800	27	2.80
2002	Sharp	27U-F500	27	2.80
2002	Sharp	20U-FS1	20	2.60
2002	Sharp	36U-S60	36	2.80
2002	Sharp	36U-S50	36	2.80
2002	Sharp	32U-S600	32	2.80
2002	Sharp	27U-S600	27	2.80
2002	Sharp	32U-F510	32	2.80
2002	Sharp	27U-F510	27	2.80
2002	Sharp	36U-S600	36	2.80
2002	Sharp	32U-S710	32	2.80
2002	Sharp	32U-S610	32	2.80
2002	Sharp	27U-S710	27	2.80
2002	Sharp	27U-S610	27	2.80
2002	Sharp	27U-S100	27	2.80
2002	Sharp	27U-S60	27	2.80
2002	Sharp	CU20FS1	20	2.60
2002	Sharp	36U-F810	36	2.80
2002	Sharp	36U-F500	36	2.80
2002	Sharp	36U-S610	36	2.80

2002	Sharp	27U-S650	27	2.80
2002	Sharp	CU32FS51	32	2.80
2002	Sharp	CU27FS51	27	2.80
2002	Sharp	CU32S5	32	2.80
2002	Sharp	CU27S71	27	2.80
2002	Sharp	36U-S650	36	2.80
2002	Sharp	CU36FS51	36	2.80
2002	Sharp	CU36S65	36	2.80
2002	Sharp	36U-F800	36	2.80
2002	Sharp	36U-F510	36	2.80
2002	Sharp	32U-S650	32	2.80
2002	Sharp	CU36S5	36	2.80
2002	Sharp	CU32S71	32	2.80
2002	Sharp	CU27S65	27	2.80
2002	Sharp	CU32S65	32	2.80
2002	Sharp	CU32S6	32	2.80
2002	Sharp	CU27S5	27	2.80
2002	Sharp	26MR70	25	2.80
2002	Sharp	21FL81	21	2.80
2002	Sharp	21FL91	21	2.80
2002	Sharp	29SL73M	27	2.80
2002	Sharp	26SL73M	25	2.80
2002	Sharp	29PL83M	27	2.80
2002	Sharp	26PL83M	25	2.80
2002	RCA	E09344	9	2.80
2002	RCA	E13308	13	2.80
2002	Secureview	S13800CL	13	2.80
2002	RCA	E13309	13	2.80
2002	RCA	E13318	13	2.80
2002	RCA	E13341	13	2.80
2002	RCA	E13342	13	2.80
2002	RCA	E13344	13	2.80
2002	RCA	E13345	13	2.80
2002	RCA	E13700	13	2.80
2002	RCA	E13701	13	2.80
2002	RCA	E13710	13	2.80
2002	RCA	E13711	13	2.80
2002	RCA	F19420	19	2.80
2002	RCA	F19430	19	2.80
2002	GE	09GP341	9	2.80
2002	GE	09GP344	9	2.80
2002	GE	13GP341	13	2.80
2002	GE	13GP344	13	2.80
2002	GE	13GP701	13	2.80
2002	GE	13GP711	13	2.80
2002	GE	19GT341	19	2.80
2002	Secureview	S13801CL	13	2.80
2002	Secureview	S12100CL	12	2.80
2002	RCA	E13319	13	2.80
2002	RCA	E09310WH	9	3.00
2002	RCA	E13335GY	13	3.00

2002	RCA	E13334WH	13	3.00
2002	RCA	E13332BC	13	3.00
2002	RCA	E13209BC	13	3.00
2002	RCA	09GP109	9	3.00
2002	RCA	09GP110	9	3.00
2002	RCA	13GP243	9	3.00
2002	RCA	E13208GY	13	3.00
2002	RCA	13GP241	9	3.00
2002	Zenith	D56W25	56	2.70
2002	Zenith	D61W25	61	2.70
2002	Zenith	D65W25	65	2.70
2002	Zenith	R50V26	50	2.70
2002	Zenith	R60V26	60	2.70
2002	Zenith	R56W28	56	2.70
2002	Zenith	R65W28	65	2.70
2002	Symphonic	SC309B	9	3.90
2002	Funai	F3809B	9	3.90
2002	Sylvania	6309CB	9	3.90
2002	EMERSON	EC313D	13	3.00
2002	Sylvania	6309CCB	9	3.90
2002	Sylvania	SSC091	9	3.90
2002	EMERSON	EWC0901	9	3.90
2002	Sylvania	SRC2109D	9	3.90
2002	Symphonic	SC313B	13	3.30
2002	Funai	F313CB	13	3.30
2002	Sylvania	6313CB	13	3.30
2002	Sylvania	W6313CB	13	3.30
2002	Sylvania	6313CCB	13	3.30
2002	Sylvania	SSC130B	13	3.30
2002	Symphonic	DSC313B	13	3.00
2002	Sylvania	D6313CB	13	3.00
2002	Sylvania	D6313CCB	13	3.00
2002	EMERSON	EWC1301	13	3.30
2002	Sylvania	SRC21134	13	3.30
2002	Sylvania	SRC21135	13	3.00
2002	Symphonic	WF-13C2	13	3.30
2002	WHITEWESTING HOUSE	WTV11321B	13	3.30
2002	Symphonic	SC319B	19	3.20
2002	Funai	F319CB	19	3.20
2002	Sylvania	6319CB	19	3.20
2002	Sylvania	6319CCB	19	3.20
2002	Sylvania	SSC191	19	3.20
2002	EMERSON	EWC1901	19	3.20
2002	Sylvania	SRC21194	19	3.20
2002	Symphonic	SC309C	9	3.10
2002	Funai	F3809C	9	3.10
2002	Sylvania	6309CC	9	3.10
2002	Emerson	EWC0902	9	3.10
2002	Sylvania	SSC092	9	3.10
2002	Sylvania	6309CCC	9	3.10
2002	Funai	F3809U	9	3.10

2002	Symphonic	SC313C	13	3.10
2002	Funai	F313CC	13	3.10
2002	Sylvania	6313CC	13	3.10
2002	Emerson	EWC1302	13	3.10
2002	Sylvania	SSC132	13	3.10
2002	Sylvania	6313CCC	13	3.10
2002	Sylvania	W6313CC	13	3.10
2002	Sylvania	WSSC132	13	3.10
2002	Symphonic	WF0213C	13	3.10
2002	Emerson	EC1320C	13	3.10
2002	Sylvania	63134C	13	3.10
2002	Symphonic	SC319C	19	3.10
2002	Funai	F319CC	19	3.10
2002	Sylvania	6319CC	19	3.10
2002	Emerson	EWC1902	19	3.10
2002	Sylvania	SSC192	19	3.10
2002	Sylvania	6319CCC	19	3.10
2002	Sylvania	WSSC192	19	3.10
2002	Sylvania	63194C	19	3.10
2002	Sylvania	SRC13DC	13	3.90
2002	Sylvania	SRC2109E	9	3.10
2002	Sylvania	SRC2213	13	3.10
2002	Sylvania	SRC22134	13	3.10
2002	Sylvania	SRC22194	19	3.10
2002	Sylvania	SRTD219	19	2.50
2002	Sylvania	6719DC	19	3.20
2002	Sylvania	SSC719C	19	3.20
2002	Emerson	EWC19T2	19	3.20
2002	Sylvania	SRCD223	23	2.50
2002	Sylvaina	6727DC	27	2.50
2002	Sylvania	SRCD227	27	2.50
2002	Sylvania	SSC727C	27	2.50
2002	Philco	PVT-2028	19	4.30
2002	Philco	PVT-1428	13	4.30
2002	JVC	TV-20F243	20	3.00
2002	JVC	AV-20FD23	20	5.00
2002	JVC	TV-13143	13	5.00
2002	JVC	TV-20242	20	2.50
2002	JVC	TV-13142	13	5.00
2002	JVC	TV-20F242	20	5.00
2002	Panasonic	PV-C1321	13	4.00
2002	Panasonic	PV-M2079	20	4.50
2002	Panasonic	PV-M2089	20	4.50
2002	Panasonic	PVQ-M2509	25	4.50
2002	Panasonic	PV-M2559	25	4.50
2002	Quasar	VV1309	13	4.50
2002	Quasar	VV2009	20	4.50
2002	Panasonic	PV-M2069W	20	4.50
2002	Quasar	VV1319W	13	4.50
2002	Panasonic	PV-M2059	20	4.50
2002	Panasonic	PV-M1379W	13	4.50

2002	Panasonic	PV-M1369	13	4.50
2002	Panasonic	PV-M1359W	13	4.50
2002	Panasonic	PV-M1349	13	4.50
2002	Panasonic	PV-M1339	13	4.50
2002	Panasonic	PV-M949W	9	4.50
2002	Panasonic	PV-M939	9	4.50
2002	Panasonic	PV-M2039	20	4.50
2002	Panasonic	PV-C2060	20	4.50
2002	Panasonic	PV-C2080	20	4.50
2002	Panasonic	PV-C2540	25	4.50
2002	Panasonic	PV-C2580	25	4.50
2002	Panasonic	PVQ-2510	25	4.50
2002	Quasar	VV-1300	13	4.50
2002	Quasar	VV-1310	13	4.50
2002	Quasar	VV-2000	20	4.50
2002	Panasonic	PV-DM2799	27	3.50
2002	Panasonic	PC-C1321	13	4.00
2002	Panasonic	PC-C1331W	13	4.00
2002	Panasonic	PV-DM2092	20	3.50
2002	Panasonic	PV-DM2792	27	3.50
2002	Panasonic	PV-DF2002	20	3.50
2002	Panasonic	PV-DF2702	27	2.50
2002	Panasonic	PVC-1321	13	4.00
2002	Panasonic	PVC-1331W	13	4.00
2002	Panasonic	PVC-1351W	13	4.00
2002	Panasonic	PV-C1371	13	4.00
2002	Panasonic	PV-C2021	20	4.00
2002	Panasonic	PV-C2031W	20	4.00
2002	Panasonic	PV-C2061	20	4.00
2002	Panasonic	PV-C2541	20	4.00
2002	Panasonic	PV-DM2791	27	3.50
2002	Memorex	MVT2195B	19	4.00
2002	Memorex	MVT2135B	13	4.00
2002	Sansui	COM3100	13	4.00
2002	Sansui	COM9100	19	4.00
2002	Philips Magnavox	CCA092AT	9	3.70
2002	Philips Magnavox	CCA132AT	13	3.30
2002	Philips Magnavox	CCA134AT	13	3.30
2002	Philips Magnavox	CCA191AT	19	3.60
2002	Philips Magnavox	CCA192AT	19	3.60
2002	Philips Magnavox	CCA193AT	19	3.60
2002	Philips Magnavox	CCA194AT	19	3.60
2002	Philips Magnavox	CCA252AT	25	2.20
2002	Philips Magnavox	CCA254AT	25	2.20
2002	Philips Magnavox	CCA255AT	25	2.20
2002	Philips Magnavox	CC13B1MG	13	3.00
2002	Philips	CCB092AT	9	3.20
2002	Philips Magnavox	CC19B1MG	19	2.90
2002	Philips	CCB130AT	13	3.00
2002	Philips	CCB130CN	13	3.00
2002	Philips	CCB132AT	13	3.00

2002	Philips	CCB134AT	13	3.00
2002	Philips	CCB190AT	19	2.90
2002	Philips	CCB192AT	19	2.90
2002	Philips	CCB193AT	19	2.90
2002	Philips	CCB194AT	19	2.90
2002	Magnavox	CC13C1MG	13	3.10
2002	Magnavox	CC19C1MG	19	2.10
2002	Philips	CCC090AT	9	3.10
2002	Philips	CCC092AT	9	3.50
2002	Philips	CCC130AT	13	3.10
2002	Philips	CCC132AT	13	3.10
2002	Philips	CCC133AT	3	3.00
2002	Philips	CCC134AT	13	3.00
2002	Philips	CCC190AT	19	2.10
2002	Samsung	CXJ1353	13	4.60
2002	Samsung	CXJ1352	13	4.60
2002	Samsung	CXJ1331	13	4.60
2002	Samsung	CXJ1364	13	4.60
2002	RCA/GE	T13021	13	4.60
2002	Samsung	CXJ1952	19	4.70
2002	Samsung	CXJ1931	19	4.70
2002	Samsung	CXJ1964	19	4.70
2002	Samsung	CXJ2512	25	4.80
2002	Samsung	V17A13**	13	4.20
2002	Samsung	V17A19**	19	4.20
2002	Samsung	VC1A20**	20	3.20
2002	Samsung	CSL20****	20	3.50
2002	Samsung	V17B09**	9	5.50
2002	Sharp	25VT-K100	25	4.80
2002	Sharp	13VT-K100	13	5.30
2002	Sharp	13VT-K150	13	5.30
2002	Sharp	13VT-L200	13	5.10
2002	Sharp	13VT-L100	13	5.10
2002	Sharp	13VT-L150	13	5.10
2002	Sharp	13VT-CL10	13	5.10
2002	Sharp	13VT-CR10	13	5.60
2002	RCA	T09084	9	5.00
2002	RCA	T13062	13	5.50
2002	RCA	T13072	13	5.50
2002	RCA	T13082	13	5.50
2002	RCA	T19064	19	5.50
2002	GE	13TVR62	13	5.50
2002	GE	13TVR72	13	5.50
2002	GE	19TVR62	19	5.50
2002	RCA	J36530	36	2.60
2002	RCA	BLV552	5.6	3.00
2002	RCA	LIFE56V	5.6	3.00
2002	RCA	T09084	9	5.00
2002	RCA	T09085	9	5.00
2002	RCA	T09088	9	5.00
2002	RCA	T25208	25	4.30

2002	RCA	T25608	25	4.30
2002	RCA	T20TF667	20	4.00
2002	RCA	T20TF668	20	5.50
2002	RCA	B27TF680	27	2.20
2002	RCA	T13208	13	4.50
2002	RCA	T19408	19	4.00
2002	RCA Scenium	D34W135D	34	1.60
2002	Toshiba	CV27E48	27	4.00
2002	Toshiba	CV32F68	32	3.70
			Average	2.99
				~ 3-W

Appendix C

Proposed Malaysian Standard for Measuring Power Consumption of Television Sets

MALAYSIAN STANDARD

MS 000:2004

POWER CONSUMPTION MEASUREMENT METHOD FOR TELEVISION SETS

DEPARTMENT OF MECHANICAL ENGINEERING UNIVERSITY OF MALAYA
50603 KUALA LUMPUR MALAYSIA

Contents

Annexes

1. Scope

- This Malaysian Standard specifies methods of measurement of electrical power consumption in both active and standby mode. It is applicable to mains powered electrical television set.
- This Standard does not specify safety requirements. It does not specify minimum performance requirements nor does it set maximum limits on power or energy consumption.

2. References

The titles of the standards publications referred to in this standard are listed in Annex A References.

3. Definitions

For the purpose of this standard, the following definitions apply.

3.1 Television

A commercially available electronic product consisting of a tuner/receiver and a monitor encased in a single housing. The monitor usually relies upon a cathode-ray tube (CRT), liquid crystal display (LCD), or other display device. The TV is designed to receive and display a television signal broadcast by antenna, satellite, or cable. For non-broadcast signals, the TV may be used as a monitor to display prerecorded video or home movies.

3.2 Active mode (on-mode)

The on-mode is the mode in which the appliance (TV) is connected to a power source and produces sound and vision.

3.3 Standby mode

The standby mode is the mode in which the appliance is connected to a power source, produces neither sound nor vision and is waiting to be switched into another mode on a receipt of a direct or indirect signal from the consumer e.g., with the remote control.

3.4 Luminance

Luminance (L) in a given direction is the luminous intensity per unit of projected area of any surface, as viewed for that direction. The luminance value is expressed in candela per square meter (cd/m^2).

4. Testing requirements

4.1 Testing area

- Measurements are to be carried out in a testing area that is free of draughts and has ambient temperature between 15 and 30°C.
- Humidity during measurement shall be below 80%, unless other values are specified.
- The television set to be measured must be at room temperature.

4.2 Measuring device

For measuring the effective power consumption (both active and standby mode), a measuring device must be used that:

- Automatically calculates the average power consumption during a time interval; or
- Carries out a time measurement parallel to the energy measurement, from which it is possible to numerically calculate the average power consumption. The measurement shall be repeated and the maximum permitted error for both measurements are 5%.
- The measurement period shall be no less than five minutes and as long as needed to achieve a resolution of ± 0.1W in the calculation of average power use.
- For measurement of standby mode in particular;
  - The measurement device shall have a crest factor of 3 (or more) at its rated range value.
  - Power measurements shall be made with a meter capable of a resolution of ±0.1W.

    Note: For measurement of active mode, meter with resolution of ±1W is satisfactory.
  - Instruments shall be capable of operating within their stated tolerances for input voltages at up to 5% Total Harmonic Distortion and shall be capable of operating at frequencies from 47 through 63 Hz.

4.3 Main voltage and frequency

The television set to be measured must be operated on a main supply at rated voltage [V_{AC}] and rated frequency [Hz]. The permissible deviation is ± 2% for the supply voltage and the main frequency. The alternating current must be a sinus wave with harmonic distortion not exceeding 5%.

4.4 TV luminance level

For measurement of active mode, TV contrast, brightness and saturation shall be adjusted to obtain the following luminance values:

- 80 cd/m^2 at white
- 30 cd/m^2 at magenta
- 2 cd/m^2 at black

If the values can not be adjusted to the stated values, the actual values shall be mentioned in the report.

If for non-CRT types of displays this setting is not practicable, a setting defined by the manufacturer shall be used. The actual setting shall be listed in the measuring report.

TVs with wide screen display shall be measured in the wide screen mode.

The volume control shall be set to obtain 50 mW at the loudspeaker terminals. In case of TVs with surround sound facility, only the front speaker terminals shall be loaded.

5. Measurements

5.1 General

The purpose of this test method is to determine the average power consumption in active and standby mode. The goal is to measure the energy consumption over a period of not less than 5 minutes and long enough to assure sufficient resolution in the calculation of average power.

Where the mode changes automatically (if television set has this feature), it may be necessary to operate a television set through the automatic sequence several times on a trial basis to ensure that sequence is fully understood and documented before test results are recorded and reported.

Note - Some television set may enter a higher power state immediately after they are switched on or off (or after the power is first connected) before dropping back to their active or standby state. Some may delay their return to their active or standby state.

5.2 Selection and preparation of television set

The television set shall be prepared and set up in accordance with the manufacturer's instructions, except where these conflict with the requirements of this test. If no instructions are given, then factory settings shall be used.

5.3 Measurement procedure

Connect the television set to the energy/power metering device. Select the conditions necessary to achieve operation in the active or standby mode. Monitor the power consumption but allow the television set to stabilize for 15 minutes. Commence energy consumption readings for a period of not less than 5 minutes and long enough to assure sufficient resolution in the calculation of average power.

Note - When the television set is in the active or standby mode (certain or particular mode), the instantaneous power readings may vary by a small amount during the recording period or the television set may draw an energy pulse at regular intervals. These variations will be averaged by measuring the energy consumption over the monitoring period.

6. Test report

The following information shall be recorded in the test report:

6.1 Television set details

- Manufacturer, brand, model, type, and serial number.
- description, *as appropriate*
- rated voltage and frequency range

6.2 Test parameters

- ambient temperature (°C).
- test voltage (V) and frequency (Hz).
- total harmonic distortion of the electricity supply system
- information and documentation on the instrumentation, set-up and circuits used for electrical testing.

6.3 Measured data, for both active and standby mode:

- average power in Watts
- period of measurement (minutes)
- description of how the active and standby mode was achieved

6.4 Test and laboratory details

- test report number/reference
- date of test
- laboratory name and address
- test officer

Annex A. References

[1] International Standard IEC 60107-1 (1997-04), *Method of measurement on receivers for television broadcast transmissions-Part 1: General considerations-Measurement at radio and video frequencies,* Typeset and printed by the IEC Central office, Geneva, Switzerland.

[2] *Energy Star® Program Requirements for TVs, VCRs, TV/VCRs, TV/DVDs and TV/VCR/DVDs, Draft 2 Eligibility Criteria (Version 2.0),* United States Energy Star® program to purchase energy efficient TV and VCR.

[3] Malaysian Standard MS 210:1974, *Methods for measuring and expressing the performance of television*, Standard Institution of Malaysia.

[4] European Standard proposal prEN 50301:1999, *Methods of measurement for the power consumption of Audio, Video and related equipment,* European Standard prepared by the Technical Committee CENELEC TC 206, Consumer equipment for entertainment and information and related sub-systems.

[5] *Guidelines for Measurement of Standby Power Use In Response to Executive Order 13221 Version June 6 2002*, United States Federal Energy Management Program for standby power.

Appendix D

Data Assessment and Sample Calculation

D.1 Predicted data assessment

D.1.1 Energy consumption in the residential sector

$$E_{2005} = 16.3065(2005-1997)^2 + 770.397(2005-1997) + 9016.4$$

D.1.2 Number of households with TV sets

$$N_{2005} = 1682.35(2005-1970)^2 + 76262.6(2005-1970) + 214519 = 4,9$$

D.1.3 Percentage of electricity generation from coal

$$P_{2005}^{coal} = -0.0006(2005-1990)^3 + 0.0972(2005-1990)^2 - 1.5046(2006-1990) + 13.8 = 11.1\%$$

D.1.4 Percentage of electricity generation from oil

$$P_{2005}^{oil} = -0.0025(2005-1990)^3 + 0.2418(2000-1990)^2 - 5.8271(2000-1990) + 41.9 = 0.5\%$$

D.1.5 Percentage of electricity generation from gas

$$P_{2005}^{gas} = -0.0137(2005-1990)^3 + 0.0037(2005-1990)^2 + 6.5787(2005-1990) + 26.2 = 79.5\%$$

D.1.6 Percentage of electricity generation from hydropower

$$P_{2005}^{hydro} = 0.0173(2005-1990)^3 - 0.3594(2005-1990)^2 + 0.8863(2005-1990) + 17.8 = 8.6\%$$

D.1 Predicted residential energy consumption and households with TV set data

Year	Residential (GWh)	Households with TV
2005	16,223	4,944,589
2006	17,271	5,140,298
2007	18,351	5,339,372
2008	19,464	5,541,811
2009	20,609	5,747,615
2010	21,787	5,956,783

D.2 Predicted percentage of fuel mix for electricity generation

Year	Coal (%)	Oil (%)	Gas (%)	Hydropower (%)
2005	11.10	0.50	79.50	8.60
2006	12.20	0.30	76.30	10.80
2007	13.40	0.40	71.80	14.00
2008	14.70	0.80	65.90	18.20
2009	16.20	1.30	58.60	23.60
2010	17.80	2.10	49.70	30.20

D.2 Energy efficiency standard

D.2.1 Statistical analysis

From Figure 4.10, the average AEC for all the plotted data in the year 2003 could be calculated as 390 kWh/year. Hence the average AEC in 2005 could be calculated by using equation (3.1).

$$AEC_{2005} = 390(1-2\%)^2 = 374.6 kWh/year$$

- Class I

Average AEC in 2005

From Figure 4.11, the average AEC for all the plotted data could be calculated as 359.2kWh/year.

10% Standard AEC

Also from Figure 4.9, the standard AEC could be calculated as 274.1kWh/year. This calculation is conducted by only averaging the data that meets the 10% standard.

- Class II

Average AEC in 2005

From Figure 4.12, the average AEC for all the plotted data could be calculated as 363.9kWh/year.

10% Standard AEC

The standard AEC could be calculated as 321kWh/year. This calculation is conducted similar to the calculation for class I.

- Class III

Average AEC in 2005

From Figure 4.13, the average AEC for all the plotted data could be calculated as 1237.3kWh/year.

10% Standard AEC

The standard AEC could be calculated as 1024kWh/year. This calculation is conducted similar to the calculation for class I.

- Class IV

Average AEC in 2005

From Figure 4.14, the average AEC for all the plotted data could be calculated as 887.7kWh/year.

10% Standard AEC

The standard AEC could be calculated as 694kWh/year. This calculation is conducted similar to the calculation for class I.

- Overall AEC value

Average AEC in 2005

The overall average AEC value is calculated by considering the market penetration value for each class of TV as stated in Table 4.21. The calculation to compute the overall average AEC value is shown below.

$$AEC_{2005} = (359.2 \times 97\%) + (363.9 \times 0.5\%) + (1237.3 \times 0.5\%) + (887.7 \times 2\%) = 374.2 kWh/year \approx 374 kWh/year \quad (D.1)$$

This value also represents the baseline energy consumption (BEC), which is the average energy consumption in the year 2005 (year standard proposed) without the presence of standard.

10% Standard AEC

$$AEC_{STD} = (274.1 \times 97\%) + (321 \times 0.5\%) + (1024 \times 0.5\%) + (694 \times 2\%) = 286.5 kWh/year \approx 287 kWh/year \quad (D.2)$$

This value also represents the standard energy consumption (SEC), which is the average energy consumption in the year 2005 (year standard proposed) with the presence of standard.

D.2.2 Engineering/economic analysis

- Class I

Present worth factor

$$PWF = \frac{1}{0.07}\left[1 - \frac{1}{(1+0.07)^{11}}\right] = 7.4987$$

Operating expenses

$$OE = 551 \times RM0.235 = RM129.49 \approx RM129$$

Life cycle cost

$$LCC = RM23{,}047 + (129.49 \times 7.4987) \approx RM24{,}018$$

Payback period

$$PBP = \frac{\ln\left(-\frac{RM129.49 - RM162}{RM23{,}047 - RM22{,}998}\right) - \ln\left(-\frac{RM129.49 - RM162}{RM23{,}047 - RM22{,}998} - 7\%\right)}{\ln(1+7\%)}$$

$$= 1.65$$

D.3 Energy label

- Step size

From the list compiled regarding TV sets energy efficiency index, E_i, the highest E_i value is recorded as 100, lowest as 48, and average E_i of 85.

Hence:

$$\delta = \frac{E_{i_{AVG}} - E_{i_{MIN}}}{3} = \frac{85 - 48}{3} = 12.3 \approx 12$$

- Label average efficiency

Minimum expected (SC-1)

To convert the central value of E_i to AEC (as shown in Table 4.25), the reference energy consumption is taken as 287kWh/year (also equivalent to SEC). The AEC value is calculated by modifying equation (3.27).

$$AEC_{SC-1} = \frac{94 \times 287}{100} = 270 kWh / year$$

Nominal expected (SC-2)

$$AEC_{SC-2} = \frac{70 \times 287}{100} = 201 kWh / year$$

This value represents the overall label average efficiency, which is used to compute the combination impact of standard and label. It is also used as an indicator in the market transformation chart (Figure 4.28).

Maximum expected (SC-3)

$$AEC_{SC-3} = \frac{46 \times 287}{100} = 132 kWh / year$$

D.4 Energy impact of standard and label

D.4.1 Impact of standard

D.4.1.1 Energy impact of standard

- Baseline energy consumption

$BEC = 374 kWh / year$ (as shown in equation D.1)

- Standard energy consumption

$SEC = 287 kWh / year$ (as shown in equation D.2)

- Initial unit energy savings

$UES_s = 374 - 287 = 87 kWh / year$

- Shipment

$Sh_{2005} = ((4,944,589 - 4,752,244) + 3,013,855) \times 1.5 = 4,809,300$

- Scaling factor

$$SF_{2005} = 1 - \left[(2005 - 2005) \times \frac{2\%}{10\%} \right] = 1.00$$

- Unit energy savings

$UES_{2005} = 1.00 \times 87 = 87 kWh / year$

- Shipment survival factor

$SSF = 100\%$

The standard effective period is shorter than 2/3 the life span of TV set. Therefore the shipment survival factor is 100%.

- Applicable stock

$AS_{2005} = (4,809,300 \times 100\%) + 0 = 4,809,300$

- Energy savings

$$ES_{2005} = 4{,}809{,}300 \times 87 \times 1.00 = 418{,}409{,}100 \text{kWh}$$

- Business as usual

$$BAU_{2005} = 4{,}809{,}300 \times 1.00 \times 374 \times 1.00 = 1{,}798{,}678{,}200 \text{kWh}$$

D.4.1.2 Economic impact of standard

- Increment of cost for TV set

For the estimation of increment cost (IC) for TV set, it is calculated based on the cost of three design options that exist in all four classes of TV (as shown in Table 4.9). The design options are listed below:

Items	Avg. Price (RM)	Avg. Annual Improvement (kWh/year)
Small signal circuitry	25.2	26.1
Power amplifier	4.8	16.7
1-W Standby technology	0	4
TOTAL	30	46.8

Hence:

$$IC = \frac{RM30}{46.8} = RM0.64/\text{kWh}$$

- Initial incremental cost

$$IIC_{2005} = 87 \times 0.64 = RM55.68$$

- Capital recovery factor

$$CRF = \frac{7\%}{\left(1-(1+7\%)^{-11}\right)} = 0.133357$$

- Cost of conserved energy

$$CCE_{2005} = \frac{RM55.68 \times 0.133357}{87} = 0.0853 RM/kWh$$

- Bill savings

$$BS_{2005} = 418{,}409{,}100 \times 0.235 = RM98{,}326{,}139$$

- *Net savings*

$$ANS_{2005} = (418{,}409{,}100 \times 0.235) - (4{,}809{,}300 \times 0.133357 \times 1.00 \times RM55.68)$$
$$= RM62{,}615{,}558$$

$$NS_{2005} = (418{,}409{,}100 \times 0.235) - (4{,}809{,}300 \times 1.00 \times RM55.68) = -169{,}455{,}686$$

- Cumulative present value

$$PV(ANS_{2005}) = \frac{RM62{,}615{,}558}{(1+7\%)^{(2005-2003)}} = RM54{,}690{,}853$$

D.4.1.3 Environmental impact of standard

- Carbon dioxide reduction

$$CO2_{2005} = 418,409,100 \times (11.1\% \times 1.18 + 0.5\% \times 0.85 + 79.5\% \times 0.53)$$
$$= 232,878,137 kg$$

- Sulfur dioxide reduction

$$SO2_{2005} = 418,409,100 \times (11.1\% \times 0.0139 + 0.5\% \times 0.0164 + 79.5\% \times 0.0005)$$
$$= 846,191 kg$$

- Nitrogen oxide reduction

$$NOX_{2005} = 418,409,100 \times (11.1\% \times 0.0052 + 0.5\% \times 0.0025 + 79.5\% \times 0.0009)$$
$$= 546,108 kg$$

- Carbon monoxide reduction

$$CO_{2005} = 418,409,100 \times (11.1\% \times 0.0002 + 0.5\% \times 0.0002 + 79.5\% \times 0.0005)$$
$$= 176,025 kg$$

D.4.2 Impact of label

The sample calculation is shown for the nominal expected case (SC-2)

D.4.2.1 Energy impact of label

- Baseline energy consumption

Baseline energy consumption for label is the standard energy consumption (as shown in equation D.2)

- Label energy consumption

$LEC_1 = 201kWh/year$ (as shown in the section for label average efficiency)

- Unit energy savings

$UES_1 = 287 - 201 = 86kWh/year$

- Shipment

Similar to the calculation for standard

- Shipment survival factor

Similar as the calculation for standard

- Applicable stock

Similar to the calculation for standard

- Annual energy savings

$ES_{2005} = 4{,}809{,}300 \times 86 = 413{,}599{,}800kWh$

D.4.2.2 Energy impact of label

- Incremental cost

Similar to the calculation for standard

- Initial incremental cost

$$IIC_1 = 86 \times RM0.64 = RM55.04$$

- Capital recovery factor

Similar as the calculation for standard

- Cost of conserved energy

$$CCE_1 = \frac{RM55.04 \times 0.133357}{86} = 0.0853 RM/kWh$$

- Bill savings

$$BS_{2005} = 413,599,800 \times 0.235 = RM97,195,953$$

- Net savings

$$ANS_{2005} = (413,599,800 \times 0.235) - (4,809,300 \times 0.133357 \times RM55.04)$$
$$= RM61,895,839$$

$$NS_{2005} = (413,599,800 \times 0.235) - (4,809,300 \times RM55.04) = -167,507,919$$

- Cumulative present value

$$PV(ANS_{2005}) = \frac{RM61,895,839}{(1+7\%)^{(2005-2003)}} = RM54,062,223$$

D.4.2.3 Environmental impact of label

- Carbon dioxide reduction

$$CO2_{2005} = 413{,}599{,}800 \times (11.1\% \times 1.18 + 0.5\% \times 0.85 + 79.5\% \times 0.53)$$
$$= 230{,}201{,}377 kg$$

- Sulfur dioxide reduction

$$SO2_{2005} = 413{,}599{,}800 \times (11.1\% \times 0.0139 + 0.5\% \times 0.0164 + 79.5\% \times 0.0005)$$
$$= 836{,}464 kg$$

- Nitrogen oxide reduction

$$NOX_{2005} = 413{,}599{,}800 \times (11.1\% \times 0.0052 + 0.5\% \times 0.0025 + 79.5\% \times 0.0009)$$
$$= 539{,}830 kg$$

- Carbon monoxide reduction

$$CO_{2005} = 413{,}599{,}800 \times (11.1\% \times 0.0002 + 0.5\% \times 0.0002 + 79.5\% \times 0.0005)$$
$$= 174{,}001 kg$$

Appendix E
Energy Label

The energy label font, color scheme and dimensions presented in this study are adapted from draft of Malaysian Standard of Energy labeling for electric fan in Malaysia (TCPHEA, 2002).

Figure E.1 Font and color scheme

E.1 Colors, fonts and dimensions

The energy label selected is based on two colors, on a white background, and has font size and color scheme as illustrated in Figure E.1.

a) Futura Extra Bold 19pt

b) Futura Book 17pt –Tracking 300

c) Futura Bold 4.7pt

d) Futura Heavy 12pt

e) Futura Bold 12pt

f) Futura Extra Bold 18pt – Horizontal Scale 71.4%

g) Futura Extra Bold 18pt

h) Zapt Dingbats 30pt

i) Futura Bold 11pt

j) Futura Bold 18pt

k) Helvetica Bold 12pt

l) Futura Bold 9pt

The color scheme of the label on a white background is as follows:

Red : Pantone 032

Black : Pantone Black

The dimensions of this energy label are illustrated in Figure E.2.

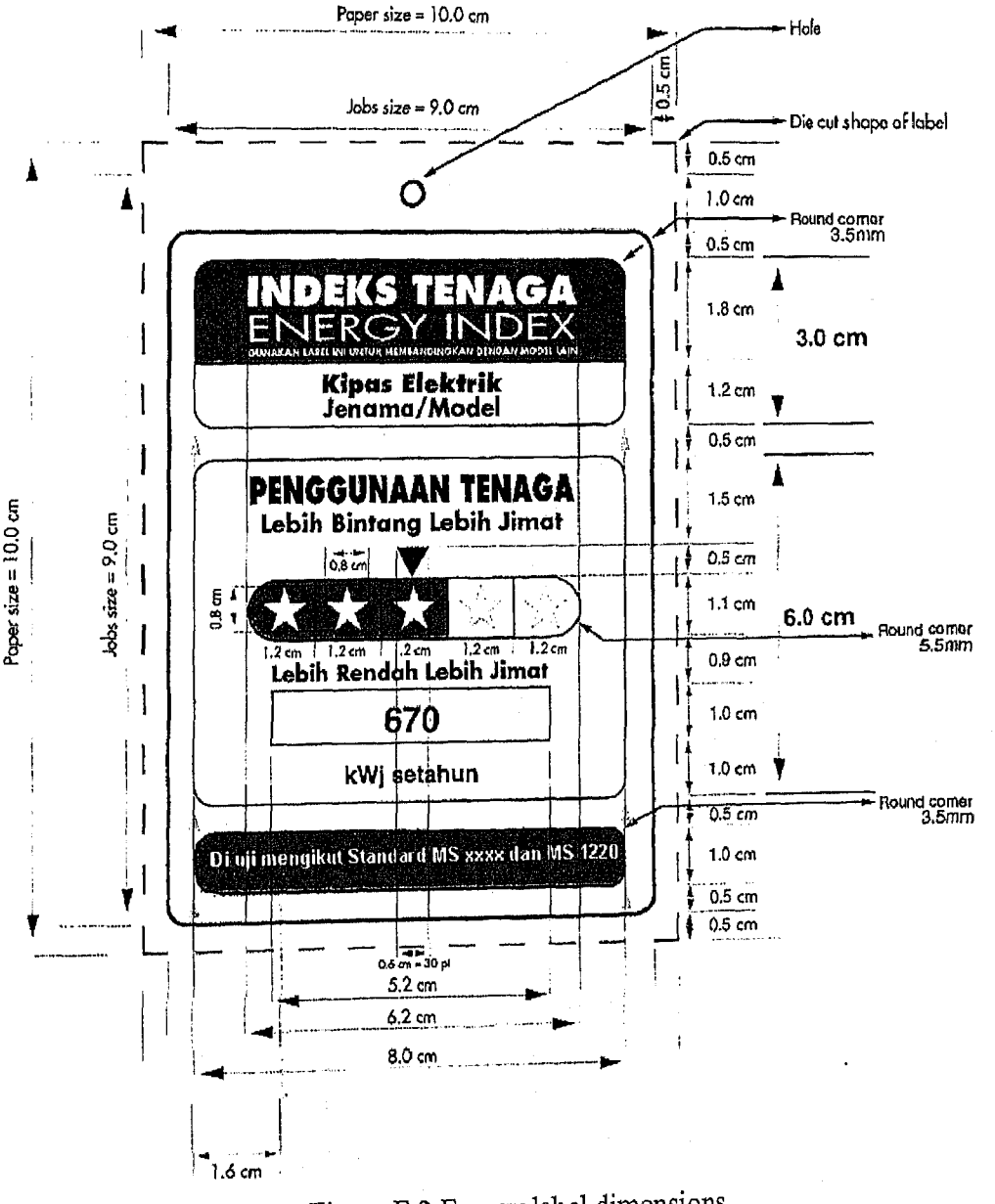


Figure E.2 Energy label dimensions

E.2 Proposed energy label for TV sets

Presented in Figure E.3 below is the translation for the proposed energy label for TV sets in Malaysia. The actual label is as illustrated in Figure 4.25.

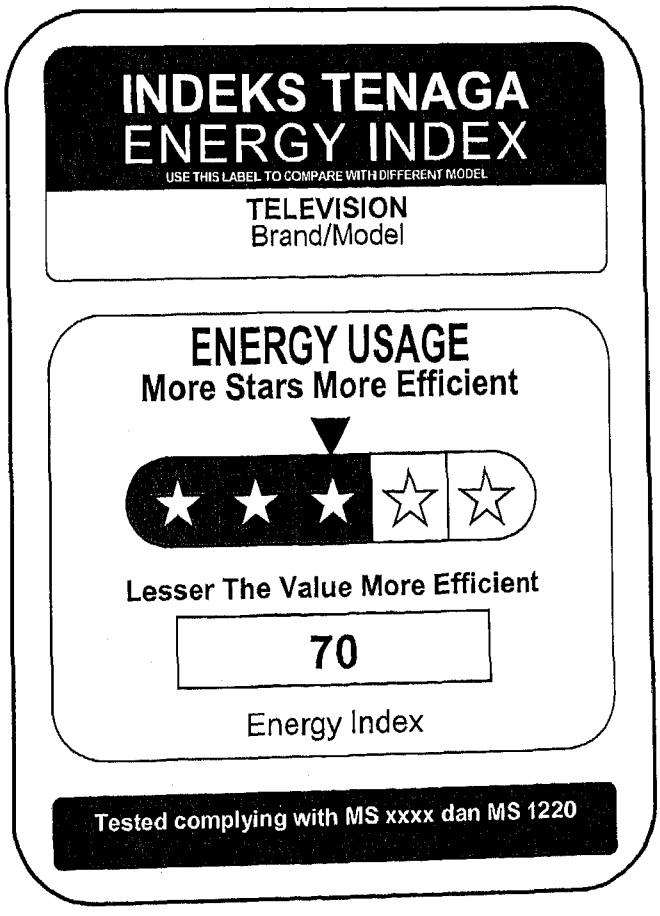


Figure 4.23 Proposed energy label translation for TV set in Malaysia