Appendix A. Specifications

The specifications of the monitor are as follows:

Maximum addressability	Horizontal: Vertical:	3840 pixels 2400 pixels	
Size (viewable image area)	Diagonal	564mm(22.2”)	
Active display area	Horizontal: Vertical:	478mm(18.7”) 299mm(11.8”)	
Brightness		235 cd/m$_2$ typical	
Contrast		400:1 typical	
Dimensions	Width: Height: Depth:	547 mm (21.5 in.) 437 mm (17.3 in.) 196 mm (7.7 in.)	
Weight	Unpackaged:	With base stand: 11.4 kg (25.1 lb.) Without stand: 8.8kg (19.4 lb.) Power adapter: 1.3 kg (2.9 lb.)	
Tilt	Angle:	-5° ~ +30°	
Power	Input:	100 - 240 V AC, 50/60 Hz	
Power consumption	Maximum: Minimum:	150 W Less than 5 W (In Standby Mode)	
Video input		DVI™ signal interface using supplied cables (RGB: 8 bits)	
User controls		Power On/Off, Brightness	
Regulatory compliance	• AN/NZS 3548 • CISPR22 A • FCC-A • IEC 60950 3rd Ed. • UL 60950 3rd Ed./CSA C22.2 No. 60950-00 • VCCI-A • ISO 13406-2 • TCO’95 • MIC E-B012-03-1124(A) (9503-DG3) • MIC E-B012-03-4147(A) (9503-DG5)		
Image Formation Time	62 ms (measured according to ISO 13406-2)		
Display area	Horizontal: Vertical:	478.1 mm (18.8 in.) 298.8 mm (11.8 in.)	
Temperature	Operating: Shipping (by Air & within 24 Hours): Shipping (other than above)/Storage:		0~35℃ -20～60℃ 1～60℃
Relative humidity	Operating: Shipping (by Air & within 24 Hours): Shipping (other than above)/Storage:		8~80%(and No Condensation) 8~80%(and No Condensation) 8~80%(and No Condensation)

Recommended configuration

The following pages contain comprehensive details of the T221's capability and attachment options. The majority of applications can be addressed by the configurations shown below.

<table>
<tr><th rowspan="2">Image motion characteristic</th><th colspan="2" rowspan="2">Typical Applications</th><th rowspan="2">Minimum Screen Update Rate</th><th colspan="3">T221</th><th rowspan="2">IBM Supported Graphics Card (NVIDIA)</th></tr>
<tr><th>Model</th><th>EDID</th><th>Firmware level</th></tr>
<tr><td rowspan="4">Primarily static
 
Smooth & life-like</td><td>2D</td><td>Office Applications
Publishing
Virtual Galleries & Museums
Digital Photography</td><td>13Hz</td><td>DG3/5</td><td>29</td><td rowspan="4">DG3 – 4.4
DG5 – 4.5</td><td>980XGL
FX1000</td></tr>
<tr><td rowspan="2">3D</td><td rowspan="2">Engineering & Modeling</td><td>20Hz</td><td>DG3/5</td><td>29</td><td>980XGL
FX1000</td></tr>
<tr><td>24Hz</td><td>DG5</td><td>02</td><td>FX2000
FX3000</td></tr>
<tr><td>Video</td><td>Image analysis (roaming, windowing, leveling)
Video Creation</td><td>48Hz</td><td>DG5</td><td>06</td><td>FX3000</td></tr>
</table>

Supported display modes

All versions of the monitor support the following modes.

1) Industry & standard modes

Addressability		DVI Input	Horizontal Frequency (kHz)	Vertical Frequency (Hz)	Pixel Clock Frequency (MHz)	Mode Scale Factor	Actual Display Resolution
VGA	640x400	ch1	31.5	70.0	25.2	5	3200x2000
	640x480	ch1	31.5	59.9	25.2	5	3200x2400
	640x480	ch1	37.9	72.8	31.5	5	3200x2400
	640x480	ch1	37.5	75.0	31.5	5	3200x2400
	640x480	ch1	43.3	85.0	36.0	5	3200x2400
SVGA	800x600	ch1	35.2	56.3	36.0	4	3200x2400
	800x600	ch1	37.9	60.3	40.0	4	3200x2400
	800x600	ch1	48.1	72.2	50.0	4	3200x2400
	800x600	ch1	46.9	75.0	49.5	4	3200x2400
	800x600	ch1	53.7	85.1	56.3	4	3200x2400
Stripe VGA*	960x1200	ch1	67.3	55.7	71.0	2	1920x2400
XGA	1024x768	ch1	48.4	60.0	65.0	3	3072x2304
	1024x768	ch1	56.5	70.1	75.0	3	3072x2304
	1024x768	ch1	60.0	75.0	78.8	3	3072x2304
	1024x768	ch1	68.7	85.0	94.5	3	3072x2304
SXGA	1280x1024	ch1	64.0	60.0	108.0	2	2560x2048
	1280x1024	ch1	80.0	75.0	135.0	2	2560x2048
UXGA	1600x1200	ch1	75.0	60.0	162.0	2	3200x2400
UXGA-Wide	1920x1200	ch1	50.0	40.9	127.2	2	3200x2400
	1920x1200	ch1	74.1	60.0	154.1	2	3200x2400
	1920x1200	ch1	59.2	48.0	151.6	2	3200x2400

Note: *This mode is for compatibility with the T221 Model DG1

2) Extended modes

The addressability of the monitor is more advanced than those provided for in the industry standard display modes so in addition, monitor specific, or extended modes, have been developed. Detailed timing information on these modes is provided to the video graphics card and system through the VESA DDC/EDID protocol. Depending on the application requirements and the capability of the video graphics card, it may be necessary to select an alternative EDID and configure the graphics card so that the optimum mode is enabled (see also Appendix B & C).

Addressability (QUXGA-W)	DVI Input	H Freq. (kHz)	V Freq. (Hz)	Pixel Clock (MHz)	EDID**												
(960x2400)x4	ch1 ~ 4	99.2	40.9	104.8				P1	P4								
(1920x1200)x4	ch1 ~ 4	50.1	40.9	104.8												P1	
(1920x1200)x4	ch1 ~ 4	50.3	40.9	127.2					P3		P2	P2	P2				
(1920x1200)x4	ch1 ~ 4	58.9	48.0	122.5	P2	P2	P4			P3				P2	P2		P1
(1920x2400)x2	ch1 ~ 2	48.8	20.1	123.4							P3						
(1920x2400)x2	ch1 ~ 2	58.4	24.0	149.5								P3					
(1920x2400)x2	ch1 ~ 2	58.2	24.0	121.0										P3			
(1920x2400)x2	ch1 ~ 2	60.9	25.0	155.8									P3				
(1920x2400)x2	ch1 ~ 2	60.7	25.0	126.3											P3		
3840x2400	ch1	30.7	12.7	148.0							P1	P1	P1				
3840x2400	ch1	29.2	12.1	116.8			P1		P1	P1				P1	P1		
3840x2400	ch1* (d)	58.2	24.0	233.0	P1												
3840x2400	ch1* (d)	60.7	25.0	243.0		P1											
2624x2400 1216x2400	ch1* (d) ch3	117.8 117.8	48.0 48.0	328.0 162.0			P2 P3										
(960x2400)x4	ch1 ~ 4	90.2	48.0	123.0						P4							
(1920x2400)x2	ch1 ~ 2	48.3	20.1	98.5					P2								
(1920x2400)x2	ch1 ~ 2	58.0	24.0	118.3						P2							

DG3/5	**Factory default setting** Single input (13Hz), twin input (20Hz) & quad input (tile - 41Hz) modes							**29**							
	DG1 compatible (enhanced), Single input (12Hz), twin input (20Hz), quad input (tile-41Hz), quad input (stripe - 41Hz)					**21**									
DG3 only	DG1 compatibility, quad input (stripe - 41Hz)				**20**										
	As default except twin input (24Hz) mode timing								**34**						
	As default except twin input (25Hz) mode timing									**35**					
DG5 only	Single input (24Hz)*, quad input (tile - 48Hz)	**02**													
	Single input (25Hz)*, quad input (tile - 48Hz)		**03**												
	Single input (12Hz), quad input (tile - 48Hz) & twin input (24Hz)										**36**				
	Single input (12Hz), quad input (tile - 48Hz) & twin input (25Hz)											**37**			
	Quad tile – 41Hz												**44**		
	Quad tile – 48Hz													**45**	
	Single input (12Hz), twin input (48Hz)*, & quad input (tile-48Hz)			**06**											
	Single input (12Hz), twin input (24Hz), quad input (tile - 48Hz), quad input (stripe - 48Hz)						**22**								

Notes:

* Requires dual-link DVI converter box

**Each EDID contains up to four extended timings, the number (P1 - P4) in the top section of the table indicates the order & priority of these timings within the EDID. The selectable EDID number for each configuration is shown in the bottom section of the table.

3) Basic timing requirements

In general, the monitor supports any modes that comply with the following limits:

Vertical frequency	: 13 - 85Hz
Horizontal frequency	: 31 - 118kHz
DVI video clock	: max. 165MHz (single link, per channel)

Appendix B. Updating the settings for your monitor

Introduction

Modern monitors internally store data on their performance characteristics and capabilities in an abbreviated format. The information is called the monitor Extended Display Identification Data or EDID and is read by operating systems and video graphics cards to determine the optimum display properties for the system. The IBM T221 is a very advanced and flexible monitor and it exceeds the capability of the EDID system to describe it fully. A special OSD menu allows alternate EDIDs to be selected which are more suitable for certain graphics cards. Unless you change the video graphics card that drives your monitor, there is usually no need to change the EDID settings. The EDID update procedure must be done carefully. If an incorrect EDID is selected, it is possible that the monitor may not display any images afterwards.

Applicable model: All models with the following firmware level

The procedure given in this document applies to monitors with firmware at the following levels:

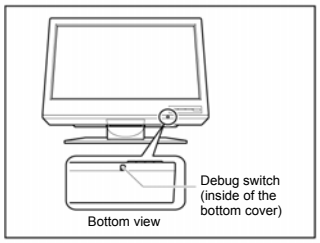
DDC CPU	Version 3.2 or higher
OSD CPU	Version 5.0 or higher
USB CPU	Version 4.0 or higher
FPGA LOGIC	Version 34 or higher

To check each version, see the next page. If you need to change the settings on a monitor that has firmware at a lower level, refer to the IBM technical website for T221 monitor.

1. Setting

a. Connect the monitor to the desired graphics card and / or computer system

b. Turn on the monitor and the computer. PC. Wait until the system has completed loading and a stable screen image is displayed. Confirm that the power indicator on the monitor shows green. If there is no image is displayed and the power indicator shows steady amber, press the Debug switch to turn on the monitor (see the following figure), the power indicator will show blinking amber. The video image from the computer will not appear but the screen will display a sequence of test patterns.

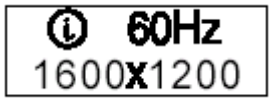


CAUTION:

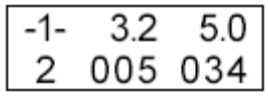
Do not use conductive material to press this switch. It may damage the electric circuit inside of the monitor.

2. Enabling the special OSD (on-screen display) menu

a. Press the leftmost OSD button (select / enter) and navigate to the (i) (information) icon by using the '←'(navigate left) or '→' (navigate right) button. Press the 'select / enter' button to access the information screen. The refresh rate and screen resolution will be displayed, as in this example:



b. Press the 'navigate left' button three times, and then press the 'navigate right' button three times. The special OSD menu will be display, as in this example:



In this display, the firmware version is shown in the following format:

-1-	aaa	bbb
c	ddd	eee

where

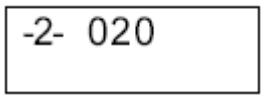
aaa:	DDC-CPU version
bbb:	OSD-CPU version
c:	Reserved
ddd:	USB-CPU version
eee:	FPGA-LOGIC version

If the special OSD menu does not appear, press the ‘select/enter’ button to exit from the OSD menu. and try again from step 2a.

3. Checking the current settings

a. In the special OSD menu, press the 'navigate left' or 'navigate right' button to show panel 2 of the special OCD menu.

b. In about five seconds, the current EDID settings will be displayed, as in this example:



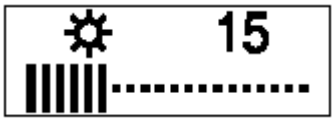
If the EDID setting is given as 000, or any number greater than 63, or a value ending in 'x', an error has occurred; repeat step 3 to try again. For details, see “Valid setting”.

4. Changing the settings

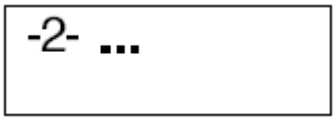
a. From the table in the 'valid setting' section, select the number of the setting you want to use.

b. Set the brightness level to the number for the EDID setting you have chosen (see user's guide), you can choose values from 0 to 20. For higher number, firstly enable the special OSD menu and then exit it by

using the 'select / enter' button. The brightness range will now extend from 0 to 63, as in this example:



c. Navigate back to the first panel of special OSD menu.
d. Press the 'navigate left' or 'navigate right' button to show panel 2. Then press both 'navigate button together, and hold them down until three dots appear on the display. The three dots show that the EDID setting is in the process of being updated.



e. Within about five seconds, the number of the new EDID setting stored in the monitor will be displayed. If it is not the setting number you want, try again.

   Note: An attempt to enter an unsupported setting number will fail. If the setting number ends in 'x', the update procedure has failed.

f. Turn off the monitor to disable the special OSD menu and return to normal operation.
g. Reboot the PC to transmit the EDID setting to the graphics card. Turn off the monitor to disable the special OSD menu and return to normal

Important notices

If the monitor is connected to a powered-off computer system, or if the screen resolution is changed, it will not be possible to program a new EDID setting.
The EDID setting cannot be reset to the original number as for the factory default values by the procedure given in this manual. To reset the EDID to an equivalent value to the factory default, check your T221 model and choose the appropriate number as below, then update the setting.

T221 Model DG3/DG5: Setting number 29

Valid Settings

The DDC-CPU firmware that performs the EDID setting process within the monitor can only detect and update certain types of EDID setting. If it encounters a setting it does not recognize, it shows 000 (unknown).
Choose the EDID setting that is appropriate for the operating system and video graphics card you are using.
If you need to use an EDID setting not listed in the table, you will need to upgrade to a later version of DDC-CPU.
EDID settings may be updated without notice. For the latest information, refer to the IBM technical support website for the T221 monitor.

EDID setting numbers and DDC-CPU versions

EDID number	Version of DDC- CPU													
	3.2	3.3	3.4	3.5	3.6	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6
02	–	–	–	–	–	o	–	–	o	o	o	–	o	–
03	–	–	–	–	–	–	–	–	o	o	o	–	o	–
06	–	–	–	–	–	–	–	–	–	–	–	–	o	–
20	o	o	o	o	o	o	o	o	o	o	o	o	–	o
21	–	–	–	–	–	–	–	–	–	–	–	o	o	o
22	–	–	–	–	–	–	–	–	–	–	–	–	o	–
29	o	o	o	o	o	o	o	o	o	o	o	o	o	o
34	–	–	o	o	o	o	o	o	o	o	–	o	–	o
35	–	–	o	o	o	o	o	o	o	o	–	o	–	o
36	–	–	–	–	–	–	–	–	–	–	o	–	o	–
37	–	–	–	–	–	–	–	–	–	–	o	–	o	–
44	–	–	–	–	–	o	o	o	o	o	o	–	o	–
45	–	–	–	–	–	o	o	o	o	o	o	–	o	–

o: the EDID number is supported by the DDC-CPU version.

-: the EDID number is not supported by the DDC-CPU version.