

Q17

TFT LCD COLOR MONITOR

TECHNICAL SERVICE MANUAL



Safety Precaution

WARNING

Service should not be attempted by anyone unfamiliar with the necessary precautions on this monitor.

The followings are the necessary precautions to be observed before servicing.

1. When managing this monitor, cover with shield plate to avoid to scratch on LCD surface.
2. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as nonmetallic control knobs, insulating covers, shields, isolation resistor capacitor network etc.
3. Before returning the monitor to the customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as signal connectors, terminals, screw heads, metal overlays, control shafts etc, to be sure the monitor is safe to operate without danger of electrical shock.

General Information

1. Description

This 17" LCD color display monitor is operated in R, G, B drive mode input.

2. Operating instructions

2-1. Front

Power Switch, Menu, Select, Down, Up, DPMS (Power) LED

2-2. Rear

Input connector (AC & Signal Cable & DVI Cable & Video Cable & USB Cable)

2-3. OSD Controls

H/V Position, Clock (H-Size), Clock Phase, Brightness, Contrast, Recall, Color Control, Preset mode, Language, OSD Adjust, Auto Adjust, Hue, Fleshtone. Input Select

3. Electrical Characteristic

3-1. Power Supply

AC/DC - Input Voltage : 90V~264V
Input Current : 1A (Max)
Input Frequency : 50 ~ 60Hz
- Output Voltage 12V /2.3A, 5V/2.5A

3-2. Video Input Signal

Level : 0.7 Vp-p analog signal(at 75 ohm termination to ground)
Polarity : Positive or Negative

3-3. Horizontal Synchronization Signal

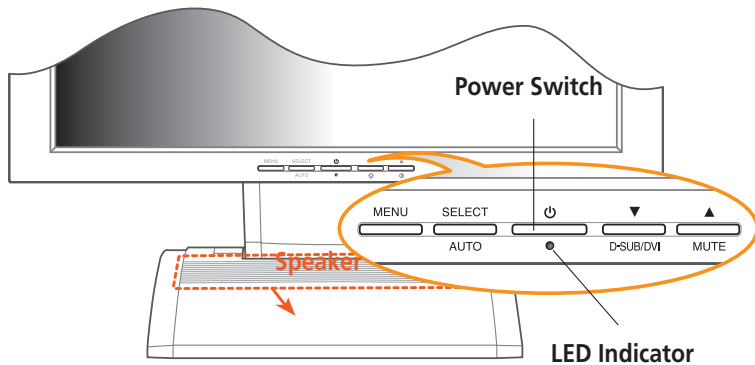
Level : TTL High : 2.4V min
Low : 0.4V max
Polarity : - or +
Frequency : 31kHz ~ 80kHz

3-4. Vertical Synchronization Signal

Level : TTL High : 2.4V min
Low : 0.4V max
Polarity : - or +
Frequency : 56Hz ~ 75Hz

Control Description

Front View



Support Modes

*Aualog R,G,B Input

No.	Resolution	H Frequency (kHz)	V Frequency (kHz)	H Polarity	V Polarity	Dot Clock (MHz)
1	720 x 400	31.5	70.1	0	1	28.322
2	640 x 480	31.5	59.9	0	0	25.175
3	640 x 480	37.5	75	0	0	31.5
4	800 x 600	35.2	56.3	1	1	36.000
5	800 x 600	37.9	60.3	1	1	40.000
6	800 x 600	48.1	72.2	1	1	50.000
7	800 x 600	46.9	75.0	1	1	49.500
8	832 x 624	49.725	74.55	0	0	57.283
9	1024 x 768	48.4	60.0	0	0	65.000
10	1024 x 768	56.5	70.1	0	0	75.000
11	1024 x 768	60.0	75.0	1	1	78.750
12	1152 x 870	68.681	75.000	1	1	100.00
13	1280 x 1024	63.900	60.000	1	1	108.00
14	1280 x 1024	79.976	75.025	1	1	135.00

*Digital R,G,B Input

No.	Resolution	H Frequency (kHz)	V Frequency (kHz)	H Polarity	V Polarity	Dot Clock (MHz)
1	640 x 480	31.5	59.9	0	0	25.175
2	800 x 600	37.9	60.3	1	1	40.000
3	1024 x 768	48.4	60.0	0	0	65.000
4	1280 x 1024	63.9	60.0	1	1	108.00

Video Input Signal

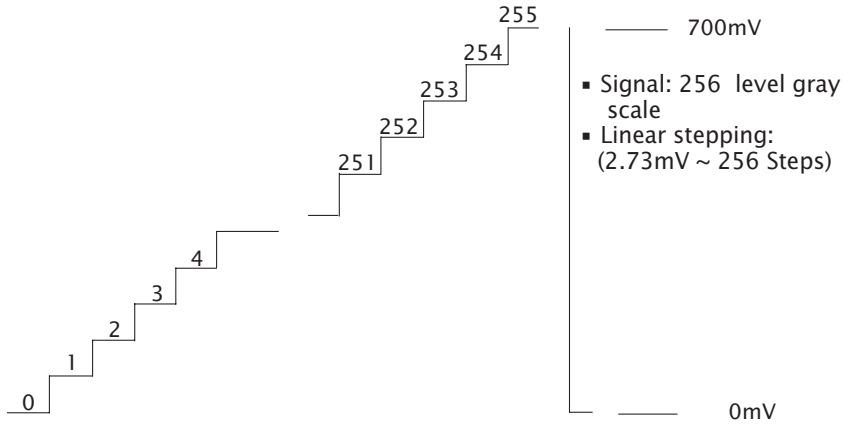
Recommended signal are shown below

■ **Video Signal**

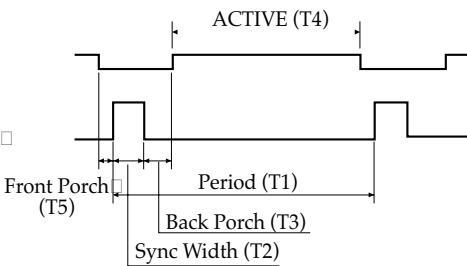
- Video level : 0 to 700mV
- Polarity : positive or Negative
- Video Input : RGB separated
- Analog level
- Sync input : H-Sync(TTL level)
- V-Sync (TTL level)

■ **Waveform**

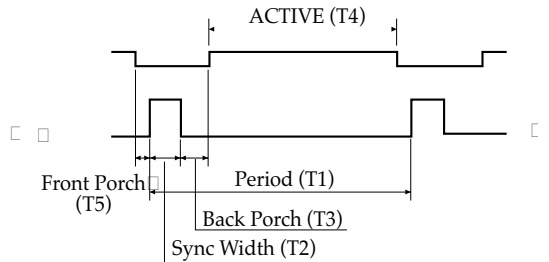
Video input(R.G.B)



■ **H-**



■ **V-Sync**



Video Input Terminal

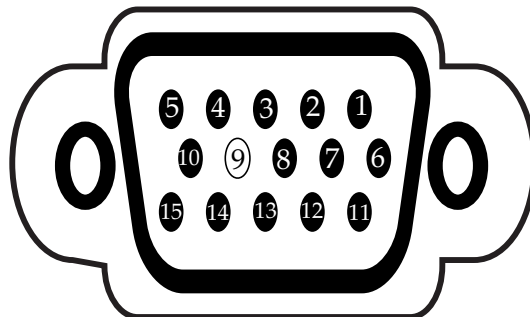
1. Analog

A 15 Pin D-sub connector is used as the input signal connector
Pin and input signals are shown in the table below.

Pin Description

PIN NO.	SIGNAL	SEPARATE SYNC/ DDC 1/2B
1		RED
2		GREEN
3		BLUE
4		GND
5		RETURN
6		RED GROUND
7		GREEN GROUND
8		BLUE GROUND
9		N.C
10		LOGIC GROUND
11		GROUND
12		SDA
13		H-SYNC(TTL)
14		V-SYNC(VCLK)
15		SCL

D-Sub miniature connector



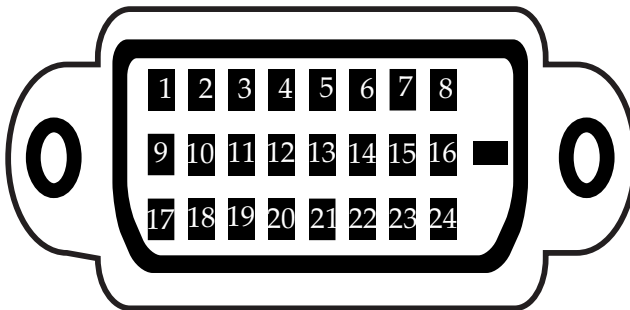
2. Digital

24 Pin DVI-D Interface connector is used as the input signal connector Pin and input signal are shown in the table below.

Pin Description

PIN NO.	SEPARATE SYNC/ DDC 1/2B	PIN NO.	SEPARATE SYNC/ DDC 1/2B
1	T.MD.S Data 2-	13	T.MD.S Data 3+
2	T.MD.S Data 2+	14	+5V Power
3	T.MD.S Data2/4 Shield	15	Ground(for +5V)
4	T.MD.S Data 4-	16	Hot Plug Detect
5	T.MD.S Data 4+	17	T.M.D.S Data 0-
6	DDC Clock	18	T.M.D.S Data 0+
7	DDC Data	19	T.M.D.S Data 0/5 Shield
8	No Connect	20	T.M.D.S Data 5-
9	T.MD.S Data 1-	21	T.M.D.S Data 5+
10	T.MD.S Data 1+	22	T.M.S.D Clock Shield
11	T.MD.S Data 1/3 Shield	23	T.M.D.S Clock +
12	T.MD.S Data 3-	24	T.M.D.S Clock -

Digital-Only Receptacle Connector



Theory of Operation

1. DC/AC INVERTER

Input voltage : DC 12V
 Input current : 2.0A(Max)
 Output current : 6mArms(TYP)
 Frequency(switching) : 60KHz(Max)
 Output power : 17W(TYP)
 On/off control voltage : 5.0V

2. DC/AC ADATOR

This display device shall maintain the specified per formances in the range de scribed below

Frequency : 50/60Hz
 Voltage : 90 - 264Vac RMS

The following consumption requirments shall be met:

Power Consumption : 45W(max absolut value)
 Current consumption : < 1.0 Aac RMS

Output Specification:
 output1 : 12V/2.3A
 output2 : 5V/2.5A

3. USB Bus-Powered HUB

This Monitor has an integral USB hub in the monitor. The hub has one upstream and two downstream ports, a controller. The hub shall meet all USB requir ements for this type of USB BUS Powered hub, including bus power switching to the downstream ports. Also, this hub fully complies with USB Specification Revision 1.1

4. Audio System

This monitor has a audio system including two micro loudspeakers.

Each of two micro loudspeakers has a 2W(Max) output power.

This system also supports a headphone(earphone) output.

- Auto Signal Input : < 600mVp-p(Max.)

- Auto Amplifiers

2W+2W Amplifier with DC Volume Control (for two micro loudspeakers)

RL=8Ω @THD=10% Vcc=14V (min. 10V, max. 18V)

Dual-Audio Power Amplifier (for a headphone output)

RL=32Ω @THD=10% Vcc=4.5V (min. 1.8V, max. 15V)

- Speaker

Micro Loudspeaker Spec.

Normal impedance 8Ω +/- 15% at 1.0V 1.5KHz

Resonance Freq. 550Hz +/- 110Hz at 1.0V

Freq. Range fo ~ 20KHz

Power Handling Capa. 1.0W / 8Ω (2.83V)

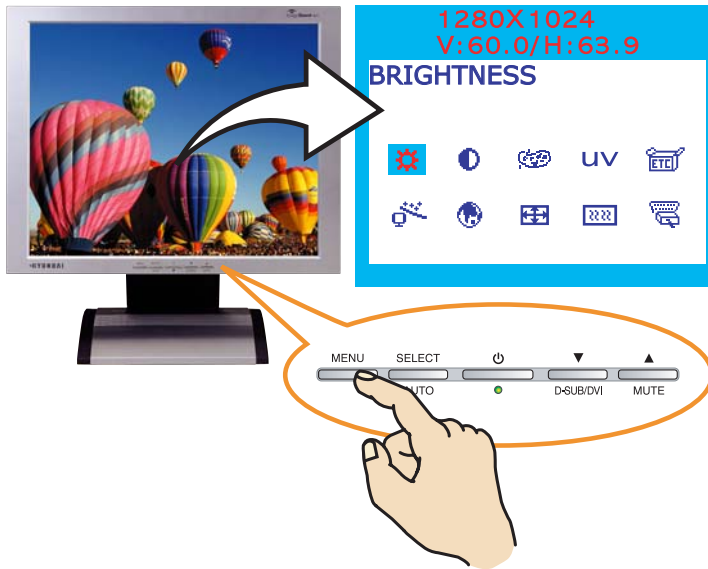
5. DPMS MODE

Status	Signal			Power Consumption	Recovery Time	LED Indicator
	H-Sync	V-Sync	Video			
on	Pulse	Pulse	Active	45W	-	Green
off	No Pulse	No Pulse	Blank	Less Than 5W	Within 3 Sec	Orange

On Screen Controls & LED Indicator

The menu for screen setting adjustment is located in the OSD and can be viewed in one of five languages OSD feature and main functions are as follows:

* Analog OSD Control



* Digital OSD Control



OSD Adjustments

The OSD adjustments available to you are listed below.



BRIGHTNESS

Adjust the brightness of the screen.



CONTRAST

Adjust the contrast of the screen.



COLOR CONTROL

Color temperature affects the tint of the image. With lower color temperatures the image turns reddish and with higher temperatures bluish.

There are three color settings available: Mode 1(a cool white), Mode 2(a warm white) or USER. With the USER setting you can set individual values for red, green and blue.



YUV COLOR

In particular, color technology allows users to make the following color adjustment.

HUE

Adjust the hue of the video image.

FLESH TONE

Adjust the flesh Tone of the video image.



MISCELLANEOUS

RECALL

Recall the saved color data.

OSD TIMER

You can set the displayed time of OSD Menu window on the screen by using this adjustment.

OSD POSITION

Adjust the OSD menu's horizontal or vertical position on the screen.

VOLUME

Adjust the audio volume level.

AUDIO

This menu is used to choose audio on or off.



AUTO ADJUST

You can adjust the shape of screen automatically at the full screen pattern.



LANGUAGE

You can select the language in which adjustment menus are displayed. The following languages are available: English, French, German, Italian, Spanish and Japanese.



H/V POSITION

H-POSITION

Adjusts the horizontal position of the entire screen image.

V-POSITION

Adjusts the vertical position of the entire screen image.



CLOCK PHASE

PHASE

Adjust the noise of the screen image.

CLOCK

Adjust the horizontal size of the entire screen image.



INPUT SELECT

This menu used to choose the desired input signal source. There are two available signal source.

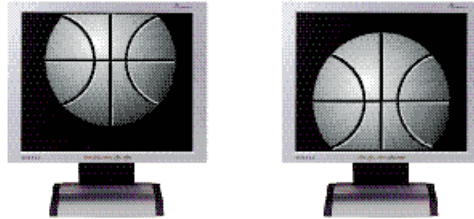
- Analog R.G.B : 15 pin D-sub, Analog Signal
- Digital TMDS : 24 pin DVI-D, Digital Signal



In case of applying Digital TMDS Input, the functions of Color Control, Auto Adjust, H/V Position, Clock Phase are not supported.

Getting Fine Picture

- Step 1.** At first Display, a full screen, such as, Window's background or "H" character should be achieved by using Editor (ex: Notepad. exe)
- Step 2.** Adjust the screen to the center of the Display(LCD), by using the top and bottom display controls. (i.e.Using V-Position Adjust menu)



- Step 3.** Adjust the screen to the center of the Display(LCD), by using the right and left display controls. (i.e.Using Clock and H-Position adjust menu)



- Step 4.** Adjust the Clock-phase until the "H" Character displays clear.



- Step 5.** Using the Contrast, Brightness, and Color Control menu, set the color to your preference.
- Step 6.** When you finish the adjustment, you can save your settings by pressing on the menu until the OSD screen has disappeared.

Factory Setting & EEPROM Initialization Method

Factory Setting Method

- Connect the signal cable and power cable to the LCD monitor.
- Press Power switch with pressed MENU key.(Menu key + Power key).
- Then, a User can change the factory setting value in OSD menu.
- Save changed value and Turn off the power s/w.
- Turn on the power, adjust the screen.

Specification

LCD Module	SIZE	17" Viewable diagonal
	Dot Pitch	0.264mm
	Contrast Ratio	450 : 1(TYP)
	Brightness	250 cd/m ² (TYP)
	Response Time	25ms (TYP)
Input	Signal	R.G.B Analog, Digital TMDS
	Connector	15 pin D-SUB Connector/Digital 24Pin DVI
SYNC	H-Freq	31.0 kHz~80 kHz
	V-Freq	56Hz ~75 Hz
Display	Area	337.92(H)X270.336(V)mm
	Color	16.7M
Recommand Resolution		1280X1024 @ 60Hz
Video Bandwidth		45MHz (Max)
User Control & OSD Control		BRIGHTNESS, CONTRAST, COLOR CONTROL, YUV COLOR, MISCELLANEOUS, AUTO ADJUST, LANGUAGE, H./V. POSITION, CLOCK-PHASE, INPUT SELECT
Power Management		VESA DPMS Standard
Plug & Play		VESA DDC 1/2B
Safety & Regulation	EMC	FCC CLASS B , CE , VCCI
	Safety	cULus, CE, TUV-GS, SEMKO, FIMKO
	Ergonomi	TCO'99
Temperature	Operating	5 to 35 °C
	Storage	- 5 to 45 °C
Humidity	Operating	30 to 80%(Non-condensing)
	Storage	5 to 90%(Non-condensing)
Weight	unpacked	4.8Kg
	packed	6.0Kg
Dimension(LXWXH mm)		396 X 414 X 200 mm

* Specification is subject to change without notice for performance improvement.

Critical Parts Specification

1. LCD Module

HT18E22-200 is a A-Si TFT active matrix color liquid crystal comprising amorphous silicon TFT attached to each signal electrode, a driving circuit and a backlight. a built-in backlight display area contains 1280X1024 pixels and can display full color (16.7M colors)

Display area	337.92(H)X270.336(V)mm
Drive system	A-Si TFT
Display color	16.7M Colors
Number of Pixel	1280X1024
Pixel arrangement	RGB vertical strip
Pixel pitch	0.264(H)X0.264(V)mm
Weight	2.2Kg
Contrast ratio	450:1
Viewing angle	
Horizontal:	70 degree , 70 degree
Vertical:	45 degree , 65 degree
Response time	20ms(max)
Luminance	250 cd/m ² (TYP)
Signal system	Digital RGB signals, Sync signals(H, V-Sync), Dot clock(DCLK) , DE(Data Enable)
Supply voltage	5.0V/12V (Typ)
Backlight	Edge light type: Four colt cathode fluorescent lamps With in- verter
Power consumption	2.8W(TYP) without B/L

(*) LCD TYPE

Vendor	Type
Hydis	HT18E22 - 300
Samsung	LTM170EH - L01

GM5020

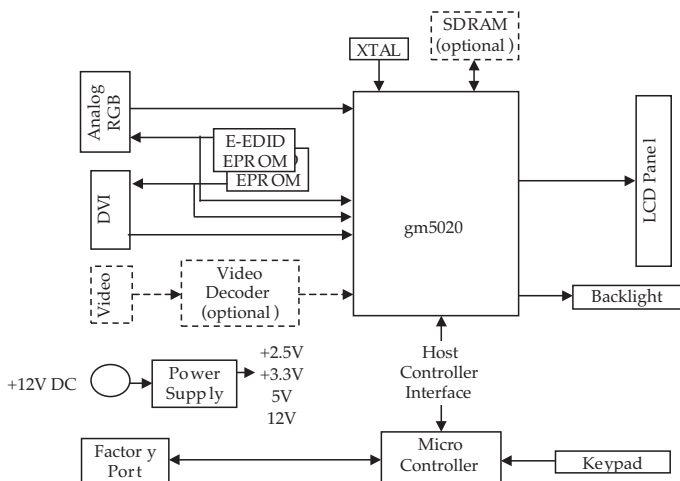
The gm5020 is a graphics processing IC providing high-quality images for LCD monitors and other pixelated displays. It combines a triple ADC, a DVI compliant TMDs receiver, a high quality zoom and shrink scaling engine, frame rate conversion, an on-screen display (OSD) controller, a microprocessor and many other functions in a single device. This high level of integration enables simple, flexible, cost-effective solutions featuring fewer required components.

The gm5020 operates at frequencies up to 160 MHz; ideal for dual-interface (analog and digital) LCD monitors up to SXGA resolutions.

gm5020 System Design Example

Figure 1 below shows a typical dual interface LCD monitor system based on the gm5020. Designs based on the gm5020 have reduced system cost and simplified hardware and firmware design because only a minimal number of components are required in the system. The chip can be used in a variety of systems, ranging from 'single-chassis' solutions for XGA and SXGA monitors with no frame store memory, up to high-end XGA and SXGA monitors featuring a frame store memory and video input.

Figure 1. gm5020 System Design Example



FE ATURES

- Zoom and shrinksca ling (all resolutions from VGA to SXGA)
- Frame rate conversion
- Integrated 8-bit triple-channel ADC / PLL
- Integrated DVI 1.0-c ompliant TMDS receiver
- Integrated High-bandwidth Digital Content Protection (HDCP)
- Embedded microcontrollersimplifies OS D creation
- on-chip versatile OSD engine
- Allsystem clocks synthesized from a single external crystal
- Programmable gamma correction (CLUT)
- RealColor fleshtone adjustment and digital color control with innovative color management
- Hue, Sa turation, Brightness, Contrast and Gamma controls for RGB and YUV signals
- PWMbacklightintensity control
- 5 Volt tolerant inputs
- High-Quality Advanced Scaling
 - Fully programmable zoom/shrink ratios
 - Independent horizontal / vertical zoom and shrink
 - Variable sharpness co ntrol
 - MoirÉ cancellation
 - Adjustable sca ling algorithms
- Analog RGB Input Port
 - Supports up to SXGA at 85Hz
 - Support for Sync-on-Green (S OG) and Composite Sync modes
- DVI Compliant Digital Input Port
 - Single link on-chip TMDS receiver
 - Operating up to160 MHz
 - Direct connect to all DVI compliant TMDS transmitters
 - High-bandwidth Digital Content Protection (HDCP)
 - Enhanced protection of HDCP se cret keys
- Digital Video Port
 - 8-bit ITU-R BT656 inputvideo
 - Seamless connection to all commercially available video capture devices

APPLICATIONS

- Multi-synchronous XGA or SXGA LCD monitors with dual analog/digital interface
- Any fixed-resolution pixelated display device

■ Auto-Configuration / Auto-Detection

- Phase and image positioning
- Input format detection
- Compatibility with all graphic cards and standard VESA modes

■ Frame Store Interface

- Fully-programmable 48 / 32-bit wide data path
- Optionaluse of data compression for more flexibility and lower system solution cost
- Support for up to 143MHz SDRAM or SGRAM

■ On-chip OSD Controller

- Bit-mapped OS D capability - 256 24-bit colors
- Horizontal and verticalstretch of OSD images
- Blinking, transparency and blending
- Enhanced Character OSD
 - On-chip RAM for downloadable fonts

■ Output Fo rmat

- Single wide up to SXGA 60Hz output
- Double wide up to SXGA 75Hz output
- Support for 8 or 6-bit panels (with high-quality dithering)

■ Operating Modes

- Frame rate conversion and scaling of images
- Bypass mode with no filtering and/or frame buffering 1:1 centering
- De-interlaced zoom
- Frame Sync and Free Run display synchronization modes

■ Highly Integrated Sol ution Provides Lowest Sy stem Cost

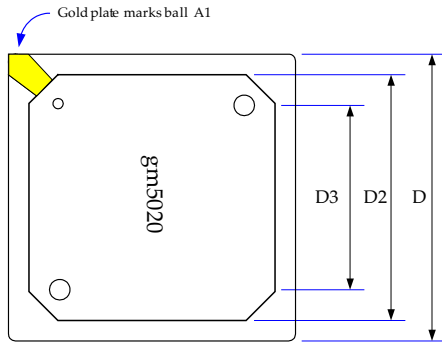
■ Simplicit y of Design Speeds Time to Market

■ Complete reference design kit available (softw are and hardware)

PACKAGE

- 292-pin PBGA

MECHANICAL SPECIFICATIONS



Symbol	mm			inches		
	MIN	NOM	MAX	MIN	NOM	MAX
A	2.20	2.33	2.46	0.087	0.092	0.098
A1	0.50	0.60	0.70	-	0.024	-
A2		1.17			0.046	
B	0.60	0.75	0.90	-	0.030	-
C		0.56		0	.022	
D	26.80	27.00	27.20	1.055	1.063	1.071
D1	-	24.13	-	-	0.950	-
D2		24.00			0.945	
D3		16			0.63	
E	-	1.27	-	-	0.050	-
F	-	-	0.15	-	-	0.006
G		30 ⁰			30 ⁰	

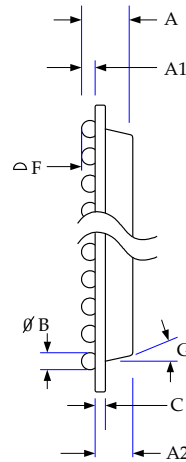
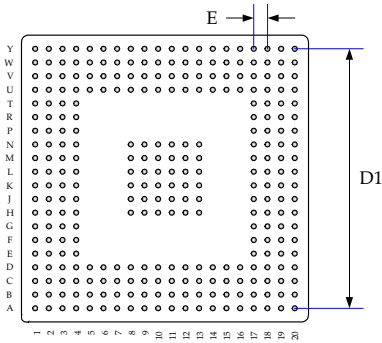


Figure 31. gm5020 292-pin PBGA

ICE2BS01

1 Pin Configuration and Functionality

1.1 Pin Configuration

Pin	Symbol	Function
1	N.C.	Not connected
2	SoftS	Soft Start & Auto Restart Control
3	FB	Regulation Feedback
4	Isense	Controller Current Sense Input
5	Gate	Driver Output
6	VCC	Controller Supply Voltage
7	GND	Controller Ground
8	N.C.	Not connected

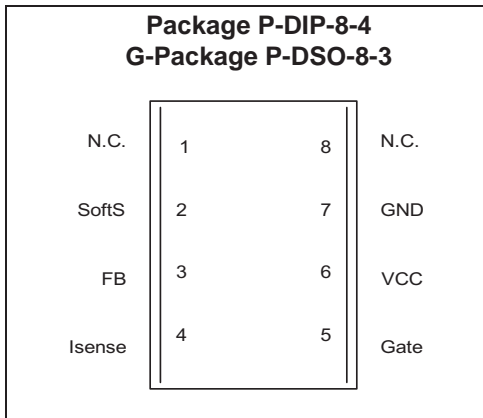


Figure 1 Pin Configuration (top view)

1.2 Pin Functionality

SoftS (Soft Start & Auto Restart Control)

This pin combines the function of Soft Start in case of Start Up and Auto Restart Mode and the controlling of the Auto Restart Mode in case of an error detection.

FB (Feedback)

The information about the regulation is provided by the FB Pin to the internal Protection Unit and to the internal PWM-Comparator to control the duty cycle.

Isense (Current Sense)

The Current Sense pin senses the voltage developed on the series resistor inserted in the source of the external Power Switch. When Isense reaches the internal threshold of the Current Limit Comparator, the Driver output is disabled. By this mean the Over Current Detection is realized.

Furthermore the current information is provided for the PWM-Comparator to realize the Current Mode.

Gate (Driver Output)

The current and slew rate capability of this pin are suited to drive Power MOSFETs.

VCC (Power supply)

This pin is the positiv supply of the IC. The operating range is between 8.5V and 21V.

To provide overvoltage protection the driver gets disabled when the voltage becomes higher than 16.5V during Start up Phase.

GND (Ground)

This pin is the ground of the primary side of the SMPS.

74LCX14

74LCX14 Low Voltage Hex Inverter with 5V Tolerant Schmitt Trigger Inputs

General Description

The LCX14 contains six inverter gates each with a Schmitt trigger input. They are capable of transforming slowly changing input signals into sharply defined, jitter-free output signals. In addition, they have a greater noise margin than conventional inverters.

The LCX14 has hysteresis between the positive-going and negative-going input thresholds (typically 1.0V) which is determined internally by transistor ratios and is essentially insensitive to temperature and supply voltage variations.

The inputs tolerate voltages up to 7V allowing the interface of 5V, 3V and 2.5V systems.

The 74LCX14 is fabricated with advanced CMOS technology to achieve high speed operation while maintaining CMOS low power dissipation.

Features

- 5V tolerant inputs
- 2.3V–3.6V V_{CC} specifications provided
- 6.5 ns t_{PD} max (V_{CC} 3.3V), 10 A I_{CC} max
- Power down high impedance inputs and outputs
- 24 mA output drive (V_{CC} 3.0V)
- Implements patented noise/EMI reduction circuitry
- Latch-up performance exceeds 500 mA
- ESD performance:

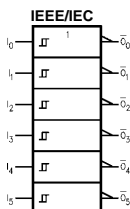
Machine model	2000V
Human model	200V

Ordering Code:

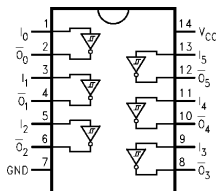
Order Number	Package Number	Package Description
74LCX14M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150 Narrow
74LCX14SJ	M14D	14-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LCX14MTC	MTC14	14-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

Logic Symbol



Connection Diagram



Pin Descriptions

Pin Names	Description
I_n	Inputs
\bar{O}_n	Outputs

Absolute Maximum Ratings(Note 1)

Symbol	Parameter	Value	Conditions	Units
V _{CC}	Supply Voltage	0.5 to 7.0		V
V _I	DC Input Voltage	0.5 to 7.0		V
V _O	DC Output Voltage	0.5 to V _{CC} 0.5	Output in HIGH or LOW State (Note 2)	V
I _{IK}	DC Input Diode Current	50	V _I GND	mA
I _{OK}	DC Output Diode Current	50	V _O GND	mA
I _O	DC Output Source/Sink Current	50	V _O V _{CC}	mA
I _{CC}	DC Supply Current per Supply Pin	100		mA
I _{GND}	DC Ground Current per Ground Pin	100		mA
T _{STG}	Storage Temperature	65 to 150		C

Recommended Operating Conditions (Note 3)

Symbol	Parameter	Min	Max	Units	
V _{CC}	Supply Voltage	Operating	2.0	3.6	V
		Data Retention	1.5	3.6	
V _I	Input Voltage	0	5.5	V	
V _O	Output Voltage	HIGH or LOW State	V _{CC}	V	
I _{OH} /I _{OL}	Output Current	V _{CC} 3.0V 3.6V		24	mA
		V _{CC} 2.7V 3.0V		12	
		V _{CC} 2.3V 2.7V		8	

Note 1: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the Absolute Maximum Ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: I_O Absolute Maximum Rating must be observed.

Note 3: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A 40 C to 85 C		Units
				Min	Max	
V _I	Positive Input Threshold		2.5	0.9	1.7	V
			3.0	1.2	2.2	
V _I	Negative Input Threshold		2.5	0.4	1.1	V
			3.0	0.6	1.5	
V _H	Hysteresis		2.5	0.3	1.0	V
			3.0	0.4	1.2	
V _{OH}	HIGH Level Output Voltage	I _{OH} 100 A	2.3 3.6	V _{CC} - 0.2		V
		I _{OH} = -8 mA	2.3	1.8		
		I _{OH} 12 mA	2.7	2.2		
		I _{OH} 18 mA	3.0	2.4		
		I _{OH} 24 mA	3.0	2.2		
V _{OL}	LOW Level Output Voltage	I _{OL} 100 A	2.3 3.6	0.2		V
		I _{OL} = 8mA	2.3	0.6		
		I _{OL} 12 mA	2.7	0.4		
		I _{OL} 16 mA	3.0	0.4		
		I _{OL} 24 mA	3.0	0.55		
I _I	Input Leakage Current	0 V _I 5.5V	2.3 3.6	5.0		A
I _{OFF}	Power-Off Leakage Current	V _I or V _O 5.5V	0	10		A
I _{CC}	Quiescent Supply Current	V _I V _{CC} or GND	2.3 3.6	10		A
		3.6V V _I 5.5V	2.3 3.6	10		
I _{CC}	Increase in I _{CC} per Input	V _{IH} V _{CC} 0.6V	2.3 3.6	500		A

AC Electrical Characteristics

Symbol	Parameter	T _A 40 C to 85 C, R _L 500						Units
		V _{CC} 3.3V 0.3V		V _{CC} 2.7V		V _{CC} 2.5V 0.2V		
		C _L 50 pF		C _L 50 pF		C _L 30 pF		
		Min	Max	Min	Max	Min	Max	
t _{PHL}	Propagation Delay Time	1.5	6.5	1.5	7.5	1.5	7.8	ns
t _{PLH}		1.5	6.5	1.5	7.5	1.5	7.8	
t _{OSHL}	Output to Output Skew (Note 4)		1.0					ns
t _{OSLH}			1.0					

Note 4: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSHL}) or LOW-to-HIGH (t_{OSLH}).

Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A 25 C	Units
				Typical	
V _{OLP}	Quiet Output Dynamic Peak V _{OL}	C _L 50 pF, V _{IH} 3.3V, V _{IL} 0V	3.3	0.8	V
		C _L 30 pF, V _{IH} 2.5V, V _{IL} 0V	2.5	0.6	
V _{OLV}	Quiet Output Dynamic Valley V _{OL}	C _L 50 pF, V _{IH} 3.3V, V _{IL} 0V	3.3	0.8	V
		C _L 30 pF, V _{IH} 2.5V, V _{IL} 0V	2.5	0.6	

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C _{IN}	Input Capacitance	V _{CC} Open, V _I 0V or V _{CC}	7	pF
C _{OUT}	Output Capacitance	V _{CC} 3.3V, V _I 0V or V _{CC}	8	pF
C _{PD}	Power Dissipation Capacitance	V _{CC} 3.3V, V _I 0V or V _{CC} , f 10 MHz	25	pF

24LC21A

1.0 ELECTRICAL CHARACTERISTICS

1.1 Maximum Ratings*

Vcc.....7.0V
 All inputs and outputs w.r.t. Vss -0.6V to Vcc +1.0V
 Storage temperature-65°C to +150°C
 Ambient temp. with power applied-65°C to +125°C
 Soldering temperature of leads (10 seconds)+300°C
 ESD protection on all pins≥ 4 kV

***Notice:** Stresses above those listed under "Maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

TABLE 1-1: PIN FUNCTION TABLE

Name	Function
WP	Write Protect (active low)
Vss	Ground
SDA	Serial Address/Data I/O
SCL	Serial Clock (Bi-directional Mode)
VCLK	Serial Clock (Transmit-Only Mode)
Vcc	+2.5V to 5.5V Power Supply
NC	No Connection

TABLE 1-2: DC CHARACTERISTICS

Vcc = +2.5V to 5.5V					
Commercial (C): Tamb = 0°C to +70°C					
Industrial (I): Tamb = -40°C to +85°C					
Parameter	Symbol	Min	Max	Units	Conditions
SCL and SDA pins:					
High level input voltage	V _{IH}	0.7 V _{CC}		V	
Low level input voltage	V _{IL}		0.3 V _{CC}	V	
Input levels on VCLK pin:					
High level input voltage	V _{IH}	2.0	0.8	V	V _{CC} ≥ 2.7V (Note)
Low level input voltage	V _{IL}		0.2 V _{CC}	V	V _{CC} < 2.7V (Note)
Hysteresis of Schmitt trigger inputs	V _{HYS}	.05 V _{CC}	—	V	(Note)
Low level output voltage	V _{OL1}		0.4	V	I _{OL} = 3 mA, V _{CC} = 2.5V (Note 1)
Low level output voltage	V _{OL2}		0.6	V	I _{OL} = 6 mA, V _{CC} = 2.5V
Input leakage current	I _{LI}	-10	10	µA	V _{IN} = 0.1V to V _{CC}
Output leakage current	I _{LO}	-10	10	µA	V _{OUT} = 0.1V to V _{CC}
Pin capacitance (all inputs/outputs)	C _{INT}		10	pF	V _{CC} = 5.0V (Note1), Tamb = 25°C, F _{CLK} = 1 MHz
Operating current	I _{CC} Write	—	3	mA	V _{CC} = 5.5V, SCL = 400 kHz
	I _{CC} Read	—	1	mA	
Standby current	I _{CCS}	—	30	µA	V _{CC} = 3.0V, SDA = SCL = V _{CC}
			100	µA	V _{CC} = 5.5V, SDA = SCL = V _{CC}

Note: This parameter is periodically sampled and not 100% tested.

1.0 ELECTRICAL CHARACTERISTICS

1.1 Maximum Ratings*

VCC.....7.0V
 All inputs and outputs w.r.t. Vss-0.6V to Vcc +1.0V
 Storage temperature-65°C to +150°C
 Ambient temp. with power applied-65°C to +125°C
 Soldering temperature of leads (10 seconds)+300°C
 ESD protection on all pins.....≥ 4 kV

***Notice:** Stresses above those listed under "Maximum ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

TABLE 1-1: PIN FUNCTION TABLE

Name	Function
\overline{WP}	Write Protect (active low)
Vss	Ground
SDA	Serial Address/Data I/O
SCL	Serial Clock (Bi-directional Mode)
VCLK	Serial Clock (Transmit-Only Mode)
Vcc	+2.5V to 5.5V Power Supply
NC	No Connection

TABLE 1-2: DC CHARACTERISTICS

VCC = +2.5V to 5.5V					
Commercial (C): Tamb = 0°C to +70°C					
Industrial (I): Tamb = -40°C to +85°C					
Parameter	Symbol	Min	Max	Units	Conditions
SCL and SDA pins:					
High level input voltage	V _{IH}	0.7 V _{CC}		V	
Low level input voltage	V _{IL}		0.3 V _{CC}	V	
Input levels on VCLK pin:					
High level input voltage	V _{IH}	2.0	0.8	V	V _{CC} ≥ 2.7V (Note)
Low level input voltage	V _{IL}		0.2 V _{CC}	V	V _{CC} < 2.7V (Note)
Hysteresis of Schmitt trigger inputs	V _{HYS}	.05 V _{CC}	—	V	(Note)
Low level output voltage	V _{OL1}		0.4	V	I _{OL} = 3 mA, V _{CC} = 2.5V (Note 1)
Low level output voltage	V _{OL2}		0.6	V	I _{OL} = 6 mA, V _{CC} = 2.5V
Input leakage current	I _{LI}	-10	10	μA	V _{IN} = 0.1V to V _{CC}
Output leakage current	I _{LO}	-10	10	μA	V _{OUT} = 0.1V to V _{CC}
Pin capacitance (all inputs/outputs)	C _{INT}		10	pF	V _{CC} = 5.0V (Note1), Tamb = 25°C, F _{CLK} = 1 MHz
Operating current	I _{CC} Write	—	3	mA	V _{CC} = 5.5V, SCL = 400 kHz
	I _{CC} Read	—	1	mA	
Standby current	I _{CCS}	—	30	μA	V _{CC} = 3.0V, SDA = SCL = V _{CC}
			100	μA	V _{CC} = 5.5V, SDA = SCL = V _{CC}

Note: This parameter is periodically sampled and not 100% tested.

TABLE 1-3: AC CHARACTERISTICS

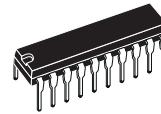
Parameter	Symbol	Vcc= 2.5-5.5V		Vcc= 4.5 - 5.5V		Units	Remarks
		Min	Max	Min	Max		
Clock frequency	FCLK	0	100	0	400	kHz	
Clock high time	THIGH	4000	—	600	—	ns	
Clock low time	TLOW	4700	—	1300	—	ns	
SDA and SCL rise time	TR	—	1000	—	300	ns	(Note 1)
SDA and SCL fall time	TF	—	300	—	300	ns	(Note 1)
START condition hold time	THD:STA	4000	—	600	—	ns	After this period the first clock pulse is generated
START condition setup time	TSU:STA	4700	—	600	—	ns	Only relevant for repeated START condition
Data input hold time	THD:DAT	0	—	0	—	ns	(Note 2)
Data input setup time	TSU:DAT	250	—	100	—	ns	
STOP condition setup time	TSU:STO	4000	—	600	—	ns	
Output valid from clock	TAA	—	3500	—	900	ns	(Note 2)
Bus free time	TBUF	4700	—	1300	—	ns	Time the bus must be free before a new transmission can start
Output fall time from VIH minimum to VIL maximum	TOF	—	250	20 + 0.1 CB	250	ns	(Note 1), CB ≤ 100 pF
Input filter spike suppression (SDA and SCL pins)	TSP	—	100	—	50	ns	(Note 3)
Write cycle time	TWR	—	10	—	10	ms	Byte or Page mode
Transmit-Only Mode Parameters							
Output valid from VCLK	TVAA	—	2000	—	1000	ns	
VCLK high time	TVHIGH	4000	—	600	—	ns	
VCLK low time	TVLOW	4700	—	1300	—	ns	
VCLK setup time	TVHST	0	—	0	—	ns	
VCLK hold time	TSPVL	4000	—	600	—	ns	
Mode transition time	TVHZ	—	500	—	500	ns	
Transmit-Only power up time	TVPU	0	—	0	—	ns	
Input filter spike suppression (VCLK pin)	TSPV	—	100	—	100	ns	
Endurance	—	10M	—	10M	—	cycles	25 °C, Vcc = 5.0V, Block Mode (Note 4)

Note 1: Not 100% tested. CB = total capacitance of one bus line in pF.

- 2: As a transmitter, the device must provide an internal minimum delay time to bridge the undefined region (minimum 300 ns) of the falling edge of SCL to avoid unintended generation of START or STOP conditions.
- 3: The combined TSP and VHYS specifications are due to Schmitt trigger inputs which provide noise and spike suppression. This eliminates the need for a TI specification for standard operation.
- 4: This parameter is not tested but guaranteed by characterization. For endurance estimates in a specific application, please consult the Total Endurance Model which can be obtained on our BBS or website.

TDA7496L

- 2W+2W OUTPUT POWER
 $R_L = 8\Omega$ @THD = 10% $V_{CC} = 14V$
- ST-BY AND MUTE FUNCTIONS
- LOW TURN-ON TURN-OFF POP NOISE
- LINEAR VOLUME CONTROL DC COUPLED WITH POWER OP. AMP.
- NO BOUCHEROT CELL
- NO ST-BY RC INPUT NETWORK
- SINGLE SUPPLY RANGING UP TO 15V
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION
- INTERNALLY FIXED GAIN
- SOFT CLIPPING
- VARIABLE OUTPUT AFTER VOLUME CONTROL CIRCUIT
- POWERDIP (14+3+3) PACKAGE



Powerdip (14+3+3)

ORDERING NUMBER: TDA7496L

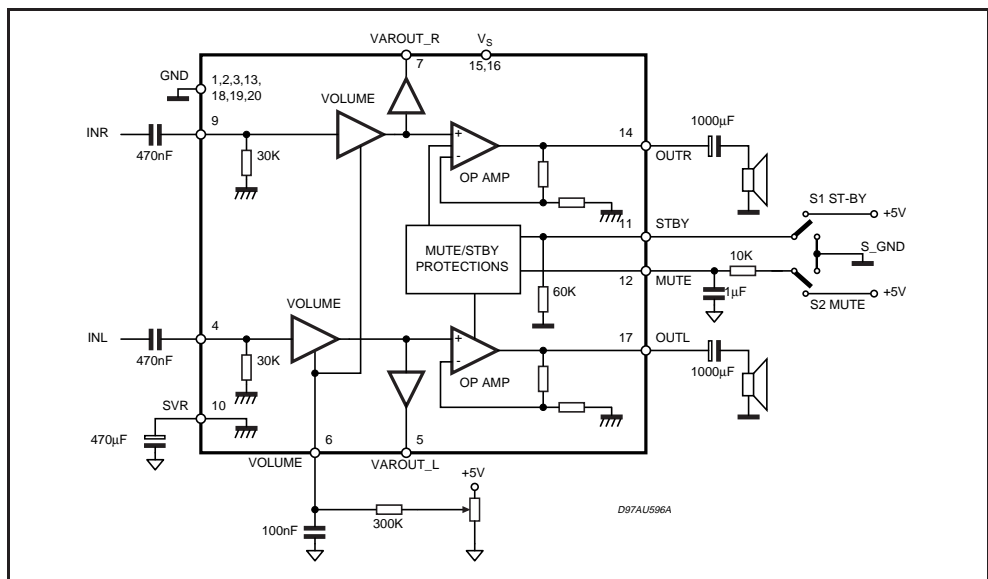
14+3+3 package, specially designed for high quality sound, TV and Monitor applications.

Features of the TDA7496L include linear volume control, Stand-by and mute functions.

DESCRIPTION

The TDA7496L is a stereo 2W+2W class AB power amplifier assembled in the @ Powerdip

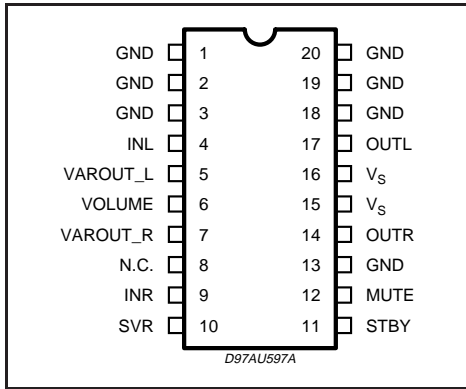
BLOCK DIAGRAM



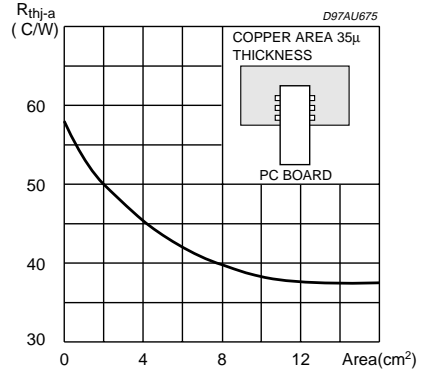
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _S	DC Supply Voltage	26	V
V _{IN}	Maximum Input Voltage	8	V _{pp}
P _{tot}	Total Power Dissipation (T _{case} = 60°C)	6	W
T _{amb}	Ambient Operating Temperature	0 to 70	°C
T _{stg} , T _j	Storage and Junction Temperature	-40 to 150	°C
V ₆	Volume CTRL DC voltage	7	V

PIN CONNECTION



R_{th} with "on board" Square Heatsink vs. copper area.



THERMAL DATA

Symbol	Parameter	Value	Unit
R _{th j-pins}	Thermal Resistance Junction-pins	max. 15	°C/W
R _{th j-amb} (*)	Thermal Resistance Junction-ambient	max. 50	°C/W

(*) Mounted on PCB with no heatsink

ELECTRICAL CHARACTERISTICS (Refer to the test circuit V_S = 14V; R_L = 8Ω, R_G = 50Ω, T_{amb} = 25 C).

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V _S	Supply Voltage Range		10		18	V
I _q	Total Quiescent Current			25	50	mA
DCVos	Output DC Offset Referred to SVR Potential	No Input Signal		200		mV
V _o	Quiescent Output Voltage			7		V
P _o	Output Power	THD = 10%; R _L = 8Ω;	1.6	2		W
		THD = 1%; R _L = 8Ω;		1.3		W
THD	Total Harmonic Distortion	G _v = 30dB; P _O = 1W; f = 1KHz;			0.4	%
I _{peak}	Output Peak Current	(internally limited)	0.7	0.9		A
V _{in}	Input Signal				2.8	V _{rms}
G _v	Closed Loop Gain	Vol Ctrl > 4.5V	28.5	30	31.5	dB
G _{vLine}	Monitor Out Gain	Vol Ctrl > 4.5V; Zload > 30KΩ	-1.5	0	1.5	dB
A _{Min VOL}	Attenuation at Minimum Volume	Vol Ctrl < 0.5V	80			dB
BW				0.6		MHz

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
en	Total Output Noise	f = 20Hz to 22KHz Play, max volume		500	800	μV
		f = 20Hz to 22KHz Play, max attenuation		100	250	μV
		f = 20Hz to 22KHz Mute		60	150	μV
SR	Slew Rate		5	8		V/ μs
R _i	Input Resistance		22.5	30		K Ω
R _{Var Out}	Variable Output Resistance			30	100	Ω
R _{load Var Out}	Variable Output Load		2			K Ω
SVR	Supply Voltage Rejection	f = 1kHz; max volume C _{SVR} = 470 μF ; V _{RIP} = 1V _{rms}	35	39		dB
		f = 1kHz; max attenuation C _{SVR} = 470 μF ; V _{RIP} = 1V _{rms}	55	65		dB
T _M	Thermal Muting			150		$^{\circ}\text{C}$
T _s	Thermal Shut-down			160		$^{\circ}\text{C}$

MUTE STAND-BY & INPUT SELECTION FUNCTIONS

V _{ST ON}	Stand-by ON Threshold		3.5			V
V _{ST OFF}	Stand-by OFF Threshold				1.5	V
V _{M ON}	Mute ON Threshold		3.5			V
V _{M OFF}	Mute OFF Threshold				1.5	V
I _{qST-BY}	Quiescent Current @ Stand-by			0.6	1	mA
AMUTE	Mute Attenuation		50	65		dB
I _{stbyBIAS}	Stand-by bias current	Stand by on V _{ST-BY} = 5V V _{MUTE} = 5V		80		μA
		Play or Mute	-20	-5		μA
I _{muteBIAS}	Mute bias current	Mute		1	5	μA
		Play		0.2	2	μA

APPLICATION SUGGESTIONS

The recommended values of the external components are those shown on the application circuit of figure 1A. Different values can be used, the following table can help the designer.

COMPONENT	SUGGESTION VALUE	PURPOSE	LARGER THAN SUGGESTION	SMALLER THAN SUGGESTION
R1	300K	Volume control circuit	Larger volume regulation time	Smaller volume regulation time
R2	10K	Volume time constant	Larger mute on/off time	Smaller mute on/off time
P1	50K	Volume control circuit		
C1	1000 μF	Supply voltage bypass		Danger of oscillation
C2	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C3	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C4	470 μF	Ripple rejection	Better SVR	Worse SVR
C5	100nF	Volume control time constant	Larger volume regulation time	Smaller volume regulation time
C6	1000 μF	Output DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C7	1 μF	Mute time constant	Larger mute on/off time	Smaller mute on/off time
C8	1000 μF	Output DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C9	100nF	Supply voltage bypass		Danger of oscillation

RC1117X25

Features

- Low dropout voltage
- Load regulation: 0.05% typical
- Trimmed current limit
- On-chip thermal limiting
- Standard SOT-223, TO-263, and TO-252 packages
- Three-terminal adjustable or fixed 2.5V, 2.85V, 3.3V, 5V

Applications

- Active SCSI terminators
- High efficiency linear regulators
- Post regulators for switching supplies
- Battery chargers
- 5V to 3.3V linear regulators
- Motherboard clock supplies

Description

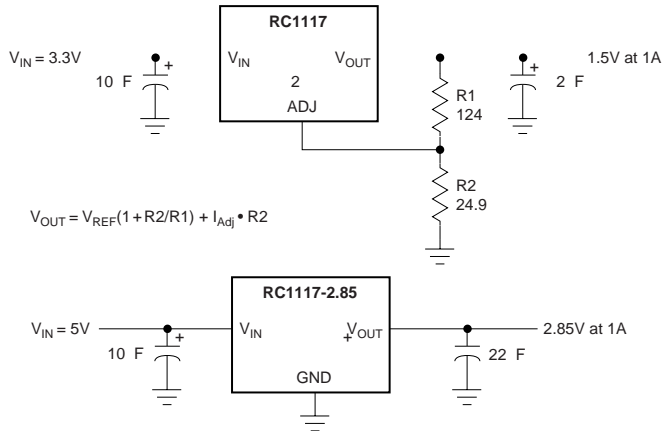
The RC1117 and RC1117-2.5, -2.85, -3.3 and -5 are low dropout three-terminal regulators with 1A output current capability. These devices have been optimized for low voltage where transient response and minimum input voltage are critical. The 2.85V version is designed specifically to be used in Active Terminators for SCSI bus.

Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures.

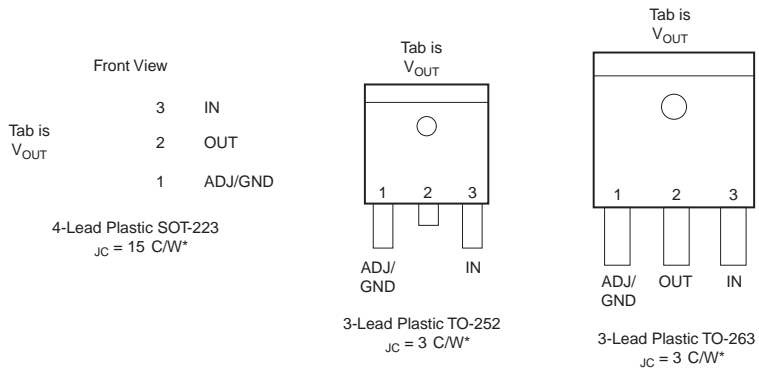
Unlike PNP type regulators where up to 10% of the output current is wasted as quiescent current, the quiescent current of the RC1117 flows into the load, increasing efficiency.

The RC1117 series regulators are available in the industry-standard SOT-223, TO-263 (D2PAK), and TO-252 (DPAK) power packages.

Typical Applications



Pin Assignments



*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane., J_A can vary from 30°C/W to more than 50°C/W. Other mounting techniques may provide better thermal resistance than 30°C/W.

Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V_{IN}		7.5	V
Operating Junction Temperature Range	0	125	C
Storage Temperature Range	-65	150	C
Lead Temperature (Soldering, 10 sec.)		300	C

Electrical Characteristics

Operating Conditions: $V_{IN} = 7V$, $T_J = 25^\circ C$ unless otherwise specified.

The \square denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions	Min.	Typ.	Max.	Units
Reference Voltage, V_{REF} ³	1.5V ($V_{IN} - V_{OUT}$) 5.75V, 10mA I_{OUT} 1A	1.225 (-2%)	1.250	1.275 (+2%)	V
Output Voltage	10mA I_{OUT} 1A RC1117-2.5, 4V V_{IN} 7V RC1117-2.85, 4.35V V_{IN} 7V RC1117-3.3, 4.8V V_{IN} 7V RC1117-5, 6.5V V_{IN} 7V	2.450 2.793 3.234 4.900	2.5 2.85 3.3 5.0	2.550 2.907 3.366 5.100	V V V V
Line Regulation ^{1,2}	($V_{OUT} + 1.5V$) V_{IN} 7V, $I_{OUT} = 10mA$		0.005	0.2	%
Load Regulation ^{1,2}	($V_{IN} - V_{OUT}$) = 2V, 10mA I_{OUT} 1A		0.05	0.5	%
Dropout Voltage	$V_{REF} = 1\%$, $I_{OUT} = 1A$		1.100	1.200	V
Current Limit	($V_{IN} - V_{OUT}$) = 2V	1.1	1.5		A
Adjust Pin Current, I_{Adj} ³			35	120	A
Adjust Pin Current Change ³	1.5V ($V_{IN} - V_{OUT}$) 5.75, 10mA I_{OUT} 1A		0.2	5	A
Minimum Load Current	1.5V ($V_{IN} - V_{OUT}$) 5.75	10			mA
Quiescent Current	$V_{IN} = V_{OUT} + 1.25V$		4	13	mA
Ripple Rejection	f = 120Hz, $C_{OUT} = 22$ F Tantalum, ($V_{IN} - V_{OUT}$) = 3V, $I_{OUT} = 1A$	60	72		dB
Thermal Regulation	$T_A = 25$ C, 30ms pulse		0.004	0.02	%/W
Temperature Stability			0.5		%
Long-Term Stability	$T_A = 125$ C, 1000hrs.		0.03	1.0	%
RMS Output Noise (% of V_{OUT})	$T_A = 25$ C, 10Hz f 10kHz		0.003		%
Thermal Resistance, Junction to Case	SOT-223		15		C/W
	TO-252, TO-263		3		C/W
Thermal Shutdown	Junction Temperature		155		C
Thermal Shutdown Hysteresis			10		C

Notes:

- See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
- Line and load regulation are guaranteed up to the maximum power dissipation (18W). Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
- RC1117 only.

RC1117X33

Features

- Low dropout voltage
- Load regulation: 0.05% typical
- Trimmed current limit
- On-chip thermal limiting
- Standard SOT-223, TO-263, and TO-252 packages
- Three-terminal adjustable or fixed 2.5V, 2.85V, 3.3V, 5V

Applications

- Active SCSI terminators
- High efficiency linear regulators
- Post regulators for switching supplies
- Battery chargers
- 5V to 3.3V linear regulators
- Motherboard clock supplies

Description

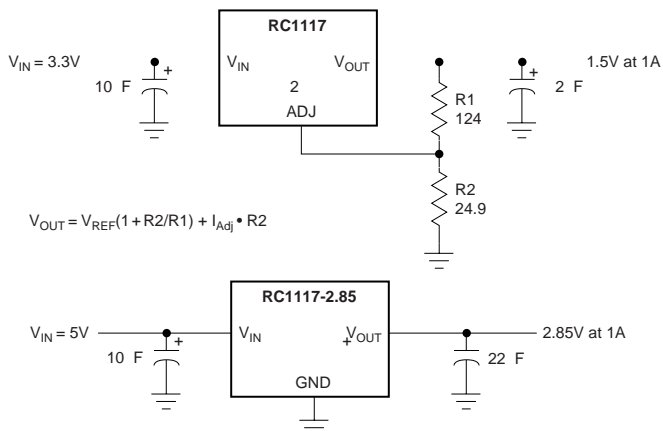
The RC1117 and RC1117-2.5, -2.85, -3.3 and -5 are low dropout three-terminal regulators with 1A output current capability. These devices have been optimized for low voltage where transient response and minimum input voltage are critical. The 2.85V version is designed specifically to be used in Active Terminators for SCSI bus.

Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperatures that would create excessive junction temperatures.

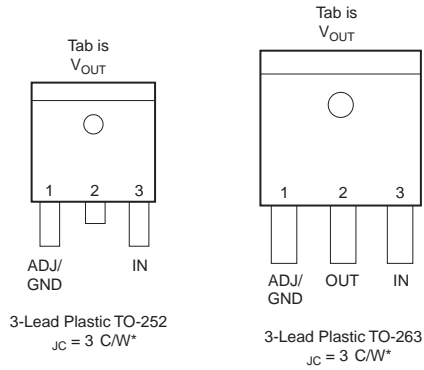
Unlike PNP type regulators where up to 10% of the output current is wasted as quiescent current, the quiescent current of the RC1117 flows into the load, increasing efficiency.

The RC1117 series regulators are available in the industry-standard SOT-223, TO-263 (D2PAK), and TO-252 (DPAK) power packages.

Typical Applications



Pin Assignments



*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane., J_A can vary from 30°C/W to more than 50°C/W. Other mounting techniques may provide better thermal resistance than 30°C/W.

Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V _{IN}		7.5	V
Operating Junction Temperature Range	0	125	C
Storage Temperature Range	-65	150	C
Lead Temperature (Soldering, 10 sec.)		300	C

Electrical Characteristics

Operating Conditions: $V_{IN} = 7V$, $T_J = 25^\circ C$ unless otherwise specified.

The \square denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions	Min.	Typ.	Max.	Units
Reference Voltage, V_{REF} ³	1.5V ($V_{IN} - V_{OUT}$) 5.75V, 10mA I_{OUT} 1A	1.225 (-2%)	1.250	1.275 (+2%)	V
Output Voltage	10mA I_{OUT} 1A RC1117-2.5, 4V V_{IN} 7V RC1117-2.85, 4.35V V_{IN} 7V RC1117-3.3, 4.8V V_{IN} 7V RC1117-5, 6.5V V_{IN} 7V	2.450 2.793 3.234 4.900	2.5 2.85 3.3 5.0	2.550 2.907 3.366 5.100	V
Line Regulation ^{1,2}	$(V_{OUT} + 1.5V)$ V_{IN} 7V, $I_{OUT} = 10mA$		0.005	0.2	%
Load Regulation ^{1,2}	$(V_{IN} - V_{OUT}) = 2V$, 10mA I_{OUT} 1A		0.05	0.5	%
Dropout Voltage	$V_{REF} = 1%$, $I_{OUT} = 1A$		1.100	1.200	V
Current Limit	$(V_{IN} - V_{OUT}) = 2V$	1.1	1.5		A
Adjust Pin Current, I_{Adj} ³			35	120	A
Adjust Pin Current Change ³	1.5V ($V_{IN} - V_{OUT}$) 5.75, 10mA I_{OUT} 1A		0.2	5	A
Minimum Load Current	1.5V ($V_{IN} - V_{OUT}$) 5.75	10			mA
Quiescent Current	$V_{IN} = V_{OUT} + 1.25V$		4	13	mA
Ripple Rejection	$f = 120Hz$, $C_{OUT} = 22$ F Tantalum, $(V_{IN} - V_{OUT}) = 3V$, $I_{OUT} = 1A$	60	72		dB
Thermal Regulation	$T_A = 25$ C, 30ms pulse		0.004	0.02	%/W
Temperature Stability			0.5		%
Long-Term Stability	$T_A = 125$ C, 1000hrs.		0.03	1.0	%
RMS Output Noise (% of V_{OUT})	$T_A = 25$ C, 10Hz f 10kHz		0.003		%
Thermal Resistance, Junction to Case	SOT-223 TO-252, TO-263		15 3		C/W C/W
Thermal Shutdown	Junction Temperature		155		C
Thermal Shutdown Hysteresis			10		C

Notes:

- See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
- Line and load regulation are guaranteed up to the maximum power dissipation (18W). Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
- RC1117 only.

RC1587

Features

- Fast transient response
- Low dropout voltage at up to 3A
- Load regulation: 0.05% typical
- Trimmed current limit
- On-chip thermal limiting
- Standard TO-220, TO-263, TO-263 center cut, and TO-252 packages

Applications

- Pentium® Class GTL+ bus supply
- Low voltage logic supply
- Post regulator for switching supply

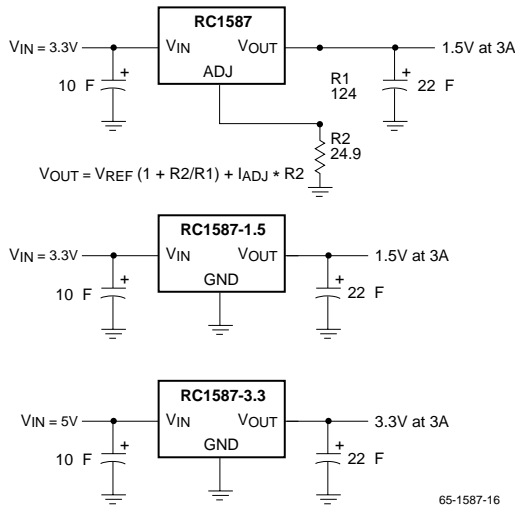
Description

The RC1587, RC1587-1.5, and RC1587-3.3 are low dropout three-terminal regulators with 3A output current capability. These devices have been optimized for low voltage applications including VTT bus termination, where transient response and minimum input voltage are critical. The RC1587 is ideal for low voltage microprocessor applications requiring a regulated output from 1.5V to 3.6V with an input supply of 5V or less. The RC1587-1.5 offers fixed 1.5V with 3A current capability for GTL+ bus VTT termination. The RC1587-3.3 offers fixed 3.3V current capability for logic IC operation.

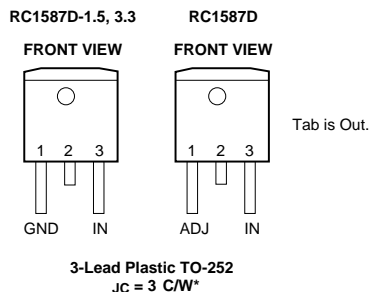
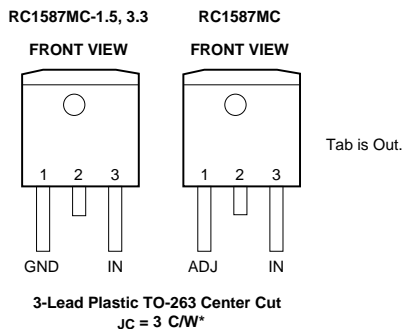
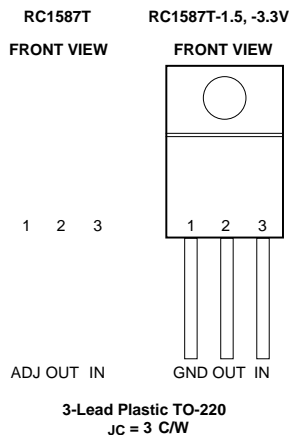
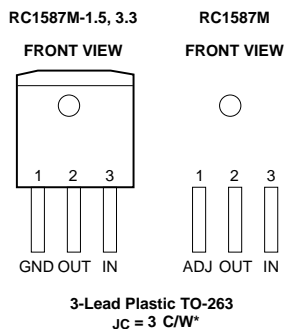
Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal limiting provides protection against any combination of overload and ambient temperature that would create excessive junction temperatures.

The RC1587, RC1587-1.5, and RC1587-3.3 are available in the industry-standard TO-220, TO-263, TO-263 center cut, and TO-252 (DPAK) power packages.

Typical Applications



Pin Assignments



*With package soldered to 0.5 square inch copper area over backside ground plane or internal power plane, JA can vary from 30 C/W to more than 40 C/W. Other mounting techniques can provide a thermal resistance lower than 30 C/W.

Absolute Maximum Ratings

Parameter	Min.	Max.	Unit
V _{IN}		7	V
Operating Junction Temperature Range	0	125	C
Storage Temperature Range	-65	150	C
Lead Temperature (Soldering, 10 sec.)		300	C

Electrical Characteristics

T_j = 25°C unless otherwise specified.

The \square denotes specifications which apply over the specified operating temperature range.

Parameter	Conditions	Min.	Typ.	Max	Units
Reference Voltage ³	1.5V (VIN – VOUT) 5.75V, 10mA IOUT 3A	1.225 (-2%)	1.250	1.275 (+2%)	V
Output Voltage ⁴	3.3V VIN 7V 10mA IOUT 3A	1.47	1.5	1.53	V
Output Voltage ⁵	5.1V VIN 7V 10mA IOUT 3A	3.234	3.3	3.366	V
Line Regulation ^{1, 2}	(VOUT + 1.5V) VIN 7V, IOUT 10mA		0.005	0.2	%
Load Regulation ^{1, 2}	(VIN – VOUT) = 3V 10mA IOUT 3A		0.05	0.5	%
Dropout Voltage	VREF = 1%, IOUT = 3A		1.150	1.300	V
Current Limit	(VIN – VOUT) = 2V	3.1	4		A
Adjust Pin Current ³			35	120	A
Adjust Pin Current Change ³	1.5V (VIN – VOUT) 5.75V, 10mA IOUT 3A		0.2	5	A
Minimum Load Current	1.5V (VIN – VOUT) 5.75V	10			mA
Quiescent Current	VIN = 5V		4	13	mA
Ripple Rejection	f = 120Hz, COUT = 22 F Tantalum, (VIN – VOUT) = 3V, IOUT = 3A	60	72		dB
Thermal Regulation	TA = 25 C, 30ms pulse		0.004	0.02	%/W
Temperature Stability			0.5		%
Long-Term Stability	TA = 125 C, 1000 hrs.		0.03	1.0	%
RMS Output Noise (% of VOUT)	TA = 25 C, 10Hz f 10kHz		0.003		%
Thermal Resistance, Junction to Case	TO-220		3		C/W
	TO-263, TO-252		3		C/W
Thermal Shutdown			150		C

Notes:

- See thermal regulation specifications for changes in output voltage due to heating effects. Load and line regulation are measured at a constant junction temperature by low duty cycle pulse testing.
- Line and load regulation are guaranteed up to the maximum power dissipation (18W). Power dissipation is determined by input/output differential and the output current. Guaranteed maximum output power will not be available over the full input/output voltage range.
- RC1587 only.
- RC1587-1.5 only.
- RC1587-3.3 only.

SPA0HN60C3

Cool MOS™ Power Transistor

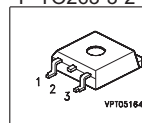
Feature

- New revolutionary high voltage technology
- Ultra low gate charge
- Periodic avalanche rated
- Extreme dv/dt rated
- High peak current capability
- Improved transconductance
- 150 °C operating temperature

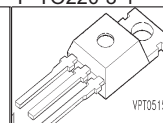
Product Summary

$V_{DS} @ T_{jmax}$	650	V
$R_{DS(on)}$	0.95	
I_D	4.5	A

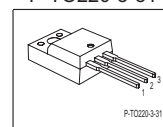
P-TO263-3-2



P-TO220-3-1



P-TO220-3-31



Type	Package	Ordering Code	Marking
SPP04N60C3	P-TO220-3-1	Q67040-S4366	04N60C3
SPB04N60C3	P-TO263-3-2	Q67040-S4407	04N60C3
SPA04N60C3	P-TO220-3-31	Q67040-S4413	04N60C3

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	2.5	K/W
Thermal resistance, junction - case, FullPAK	R_{thJC_FP}	-	-	4	
Thermal resistance, junction - ambient, leaded	R_{thJA}	-	-	62	
Thermal resistance, junction - ambient, FullPAK	R_{thJA_FP}	-	-	80	
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ³⁾	R_{thJA}	-	-	62	
Linear derating factor		-	-	0.4	W/K
Linear derating factor, FullPAK		-	-	0.25	
Soldering temperature, 1.6 mm (0.063 in.) from case for 10s	T_{sold}	-	-	260	°C

Electrical Characteristics, at $T_j = 25\text{ °C}$, unless otherwise specified

Static Characteristics					
Drain-source breakdown voltage $V_{GS}=0V, I_D=0.25mA$	$V_{(BR)DSS}$	600	-	-	V
Drain-source avalanche breakdown voltage $V_{GS}=0V, I_D=4.5A$	$V_{(BR)DS}$	-	700	-	
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 200 A$	$V_{GS(th)}$	2.1	3	3.9	
Zero gate voltage drain current $V_{DS} = 600 V, V_{GS} = 0 V, T_j = 25\text{ °C}$ $V_{DS} = 600 V, V_{GS} = 0 V, T_j = 150\text{ °C}$	I_{DSS}	-	0.5	1	A
		-	-	50	
Gate-source leakage current $V_{GS}=30V, V_{DS}=0V$	I_{GSS}	-	-	100	nA
Drain-source on-state resistance $V_{GS}=10V, I_D=2.8A, T_j=25\text{ °C}$ $V_{GS}=10V, I_D=2.8A, T_j=150\text{ °C}$	$R_{DS(on)}$	-	0.85	0.95	
		-	2.35	2.62	
Gate input resistance $f = 1\text{ MHz, open drain}$	R_G	-	0.95	-	

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Characteristics						
Transconductance	g_{fs}	$V_{DS} = 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = 2.8A$	-	4.4	-	S
Input capacitance	C_{iss}	$V_{GS} = 0V$, $V_{DS} = 25V$,	-	490	-	pF
Output capacitance	C_{oss}	$f = 1MHz$	-	160	-	
Reverse transfer capacitance	C_{rss}		-	15	-	
Effective output capacitance, ⁴⁾ energy related	$C_{o(er)}$	$V_{GS} = 0V$, $V_{DS} = 0V$ to 480V	-	20	-	
Effective output capacitance, ⁵⁾ time related	$C_{o(tr)}$		-	35	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 380V$, $V_{GS} = 0/10V$,	-	6	-	ns
Rise time	t_r	$I_D = 4.5A$,	-	2.5	-	
Turn-off delay time	$t_{d(off)}$	$R_G = 18$	-	58.5	80	
Fall time	t_f		-	9.5	14	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	$V_{DD} = 480V$, $I_D = 4.5A$	-	2.2	-	nC
Gate to drain charge	Q_{gd}		-	8.8	-	
Gate charge total	Q_g	$V_{DD} = 480V$, $I_D = 4.5A$, $V_{GS} = 0$ to 10V	-	19	25	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 480V$, $I_D = 4.5A$	-	5	-	V

¹Limited only by maximum temperature

²Repetitive avalanche causes additional power losses that can be calculated as $P_{AV} = E_{AR} \cdot f$.

³Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm (one layer, 70 μ m thick) copper area for drain connection. PCB is vertical without blown air.

⁴ $C_{o(er)}$ is a fixed capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .

⁵ $C_{o(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS} .

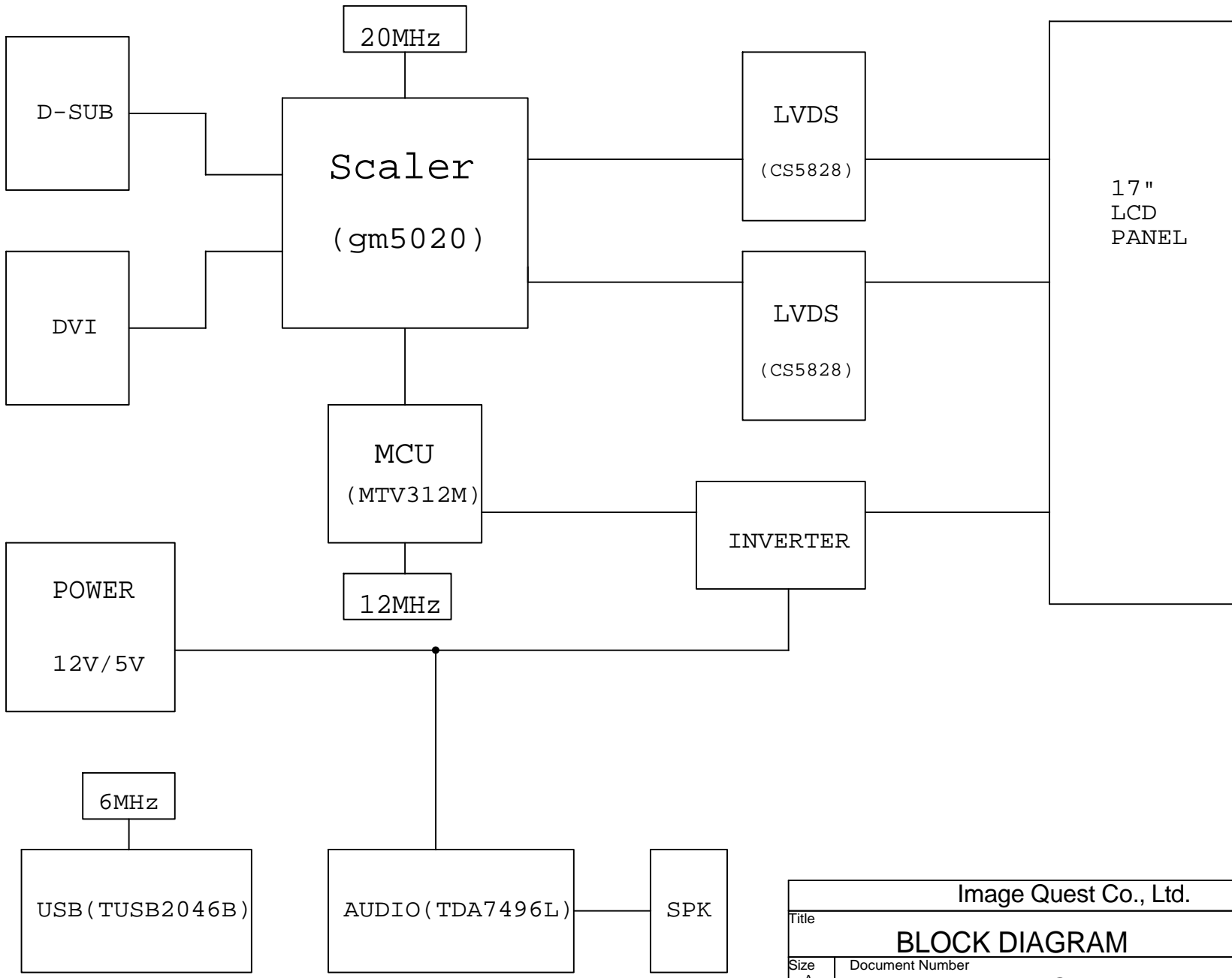


Image Quest Co., Ltd.			
Title			
BLOCK DIAGRAM			
Size A	Document Number		Rev 0
Date: Monday, November 11, 2002		Sheet 1 of 1	
		Q17	

PART LIST

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
1	C300	2121030029	CAP-C-C,0.01UF 50V K X7R	
2	C301	2121030029	CAP-C-C,0.01UF 50V K X7R	
3	C302	2121030029	CAP-C-C,0.01UF 50V K X7R	
4	C303	2121030029	CAP-C-C,0.01UF 50V K X7R	
5	C304	2121030029	CAP-C-C,0.01UF 50V K X7R	
6	C305	2121030029	CAP-C-C,0.01UF 50V K X7R	
7	C306	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
8	C307	E4001020808J	CAP,CHIP 50V 47PF J 1608	
9	C308	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
10	C400	2012200005	CAP-AL-C,22UF 16V M 5052	
11	C401	2012200005	CAP-AL-C,22UF 16V M 5052	
12	C402	2012200005	CAP-AL-C,22UF 16V M 5052	
13	C403	2012200005	CAP-AL-C,22UF 16V M 5052	
14	C404	2012200005	CAP-AL-C,22UF 16V M 5052	
15	C405	2012200005	CAP-AL-C,22UF 16V M 5052	
16	C406	2012200005	CAP-AL-C,22UF 16V M 5052	
17	C407	2012200005	CAP-AL-C,22UF 16V M 5052	
18	C408	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
19	C409	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
20	C410	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
21	C411	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
22	C412	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
23	C413	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
24	C414	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
25	C415	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
26	C500	2011000006	CAP-AL-C,10UF 16V M 4052	
27	C501	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
28	C502	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
29	C503	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
30	C504	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
31	C505	2011000006	CAP-AL-C,10UF 16V M 4052	
32	C506	2011000006	CAP-AL-C,10UF 16V M 4052	
33	C507	CC7FCA1H180J	CAP-CC,18PF 50V J COG 16	
34	C508	CC7FCA1H180J	CAP-CC,18PF 50V J COG 16	
35	C509	201109000401	CAP-AL-C,1UF 50V M 4052	
36	C510	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
37	C511	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
38	C512	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
39	C513	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
40	C514	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
41	C515	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
42	C516	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
43	C517	201109000401	CAP-AL-C,1UF 50V M 4052	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
44	C600	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
45	C601	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
46	C602	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
47	C603	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
48	C604	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
49	C605	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
50	C606	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
51	C607	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
52	C608	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
53	C609	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
54	C610	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
55	C611	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
56	C612	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
57	C613	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
58	C614	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
59	C615	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
60	C616	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
61	C617	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
62	C618	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
63	C619	2012200005	CAP-AL-C,22UF 16V M 5052	
64	C620	2012200005	CAP-AL-C,22UF 16V M 5052	
65	C621	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
66	C622	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
67	C623	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
68	C624	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
69	C625	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
70	C626	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
71	C627	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
72	C628	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
73	C629	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
74	C630	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
75	C631	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
76	C632	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
77	C633	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
78	C634	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
79	C635	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
80	C636	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
81	C638	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
82	C639	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
83	C640	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
84	C641	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
85	C642	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
86	C643	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
87	C644	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
88	C645	CC7FCA1H221J	CAP CER CP 220P 50V J 06	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
89	C647	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
90	C648	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
91	C649	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
92	C650	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
93	C651	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
94	C652	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
95	C653	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
96	C654	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
97	C655	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
98	C656	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
99	C658	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
100	C659	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
101	C660	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
102	C661	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
103	C662	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
104	C663	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
105	C664	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
106	C665	CC7FCA1H221J	CAP CER CP 220P 50V J 06	
107	C666	2012200005	CAP-AL-C,22UF 16V M 5052	
108	C667	2012200005	CAP-AL-C,22UF 16V M 5052	
109	C668	2012200005	CAP-AL-C,22UF 16V M 5052	
110	C669	2125090017	CAP-C-C,5PF 50V J COG 16	
111	C670	2125090017	CAP-C-C,5PF 50V J COG 16	
112	C700	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
113	C701	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
114	C702	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
115	C703	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
116	C704	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
117	C705	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
118	C706	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
119	C707	CC7FCA1H330J	CAP-CC,33PF 50V J 1608	
120	C708	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
121	C709	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
122	C710	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
123	C711	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
124	C712	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
125	C713	2011010014	CAP-AL-C,100UF 16V M 635	
126	C714	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
127	C715	2121050045	CAP-C-C,1UF 50V Z Y5V 16	
128	C716	2011010014	CAP-AL-C,100UF 16V M 635	
129	C717	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
130	C718	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
131	C719	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
132	C720	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
133	C721	2121040045	CAP-C-C,0.1UF 50V Z Y5V	

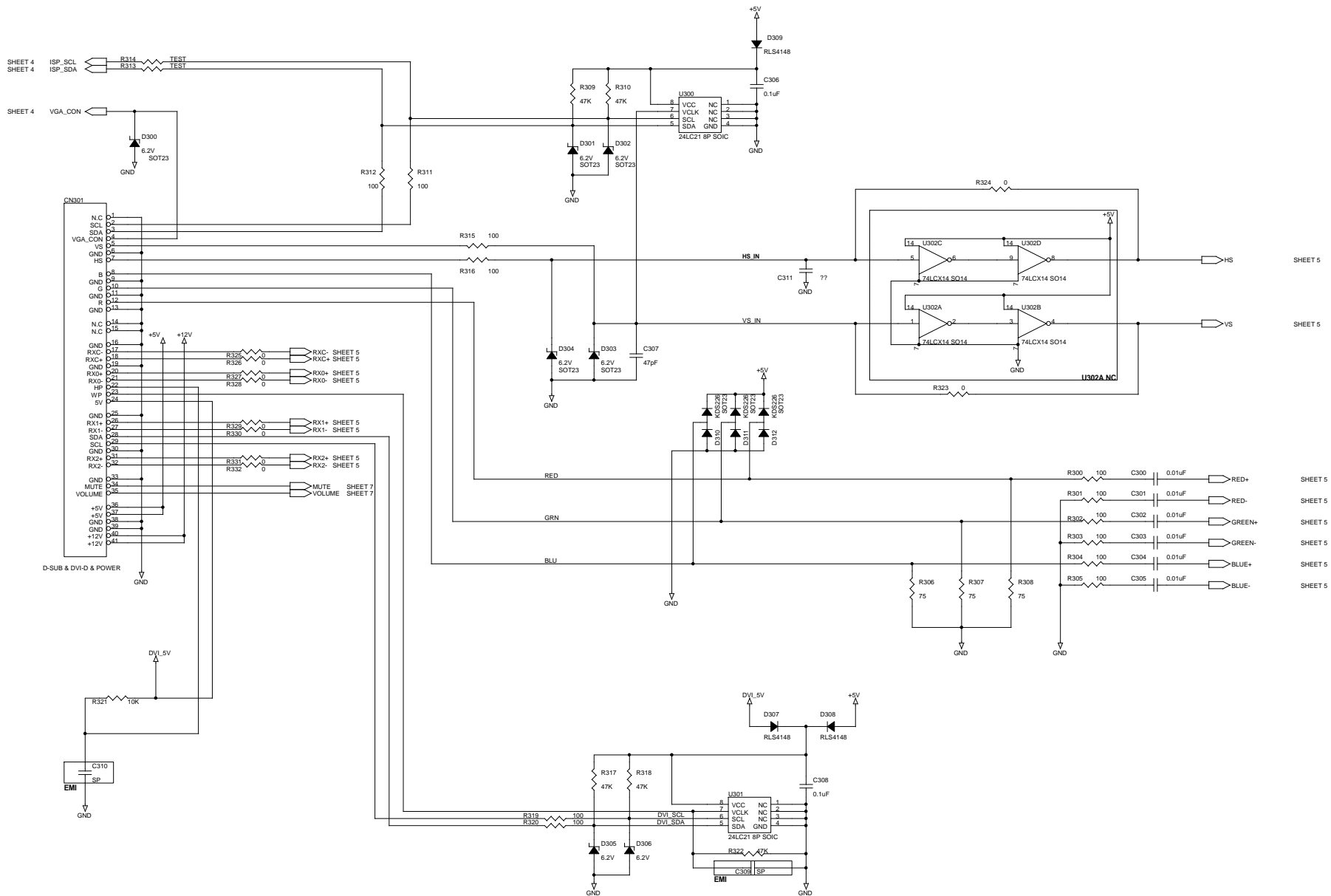
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
134	C722	2121040045	CAP-C-C,0.1UF 50V Z Y5V	
135	CN301	3720101990	CONN-M,GT121-41P-LD 41	
136	CN501	3720101988	CONN-M,52207-0890 8	
137	CN502	3720101989	CONN-M,53261-0690 6	
138	CN700	3720101983	CONN-M,12507WR-30A00 30	
139	D300	3101000376	DI-ZN,Z02W6.2V SMD	
140	D301	3101000376	DI-ZN,Z02W6.2V SMD	
141	D302	3101000376	DI-ZN,Z02W6.2V SMD	
142	D303	3101000376	DI-ZN,Z02W6.2V SMD	
143	D304	3101000376	DI-ZN,Z02W6.2V SMD	
144	D305	3101000376	DI-ZN,Z02W6.2V SMD	
145	D306	3101000376	DI-ZN,Z02W6.2V SMD	
146	D307	DTRLS4148	DIODE,CHIP S/W RLS4148	
147	D308	DTRLS4148	DIODE,CHIP S/W RLS4148	
148	D309	DTRLS4148	DIODE,CHIP S/W RLS4148	
149	D310	3100100038	DI-AR,KDS226 SMD	
150	D311	3100100038	DI-AR,KDS226 SMD	
151	D312	3100100038	DI-AR,KDS226 SMD	
152	D500	DTRLS4148	DIODE,CHIP S/W RLS4148	
153	IC801	3200001310	IC-LIN,TDA7496L DIP	
154	IC901	3205001389	IC-U,TUSB2046B QFP USB I	
155	J902	372110108601	CONN-F,USB A -TYPE 4	
156	L401	3540800008	COR-CHP,HB-1M2012-601JT	
157	L402	3540800008	COR-CHP,HB-1M2012-601JT	
158	L403	3540800008	COR-CHP,HB-1M2012-601JT	
159	L404	3540800008	COR-CHP,HB-1M2012-601JT	
160	L501	3540800054	COR-CHP,HB-1M1608-600JT	
161	L502	3540800054	COR-CHP,HB-1M1608-600JT	
162	L503	3540800054	COR-CHP,HB-1M1608-600JT	
163	L504	3540800054	COR-CHP,HB-1M1608-600JT	
164	LC701	3540800054	COR-CHP,HB-1M1608-600JT	
165	LC702	3540800054	COR-CHP,HB-1M1608-600JT	
166	LC703	3540800054	COR-CHP,HB-1M1608-600JT	
167	LC704	3540800054	COR-CHP,HB-1M1608-600JT	
168	R300	RK1JC0T0101J	RES-C,100 0.063W J 1608	
169	R301	RK1JC0T0101J	RES-C,100 0.063W J 1608	
170	R302	RK1JC0T0101J	RES-C,100 0.063W J 1608	
171	R303	RK1JC0T0101J	RES-C,100 0.063W J 1608	
172	R304	RK1JC0T0101J	RES-C,100 0.063W J 1608	
173	R305	RK1JC0T0101J	RES-C,100 0.063W J 1608	
174	R306	2607509010	RES-C,75 0.063W F 1608	
175	R307	2607509010	RES-C,75 0.063W F 1608	
176	R308	2607509010	RES-C,75 0.063W F 1608	
177	R309	RK1JC0T0473J	RES-C,47K 0.063W J 1608	
178	R310	RK1JC0T0473J	RES-C,47K 0.063W J 1608	

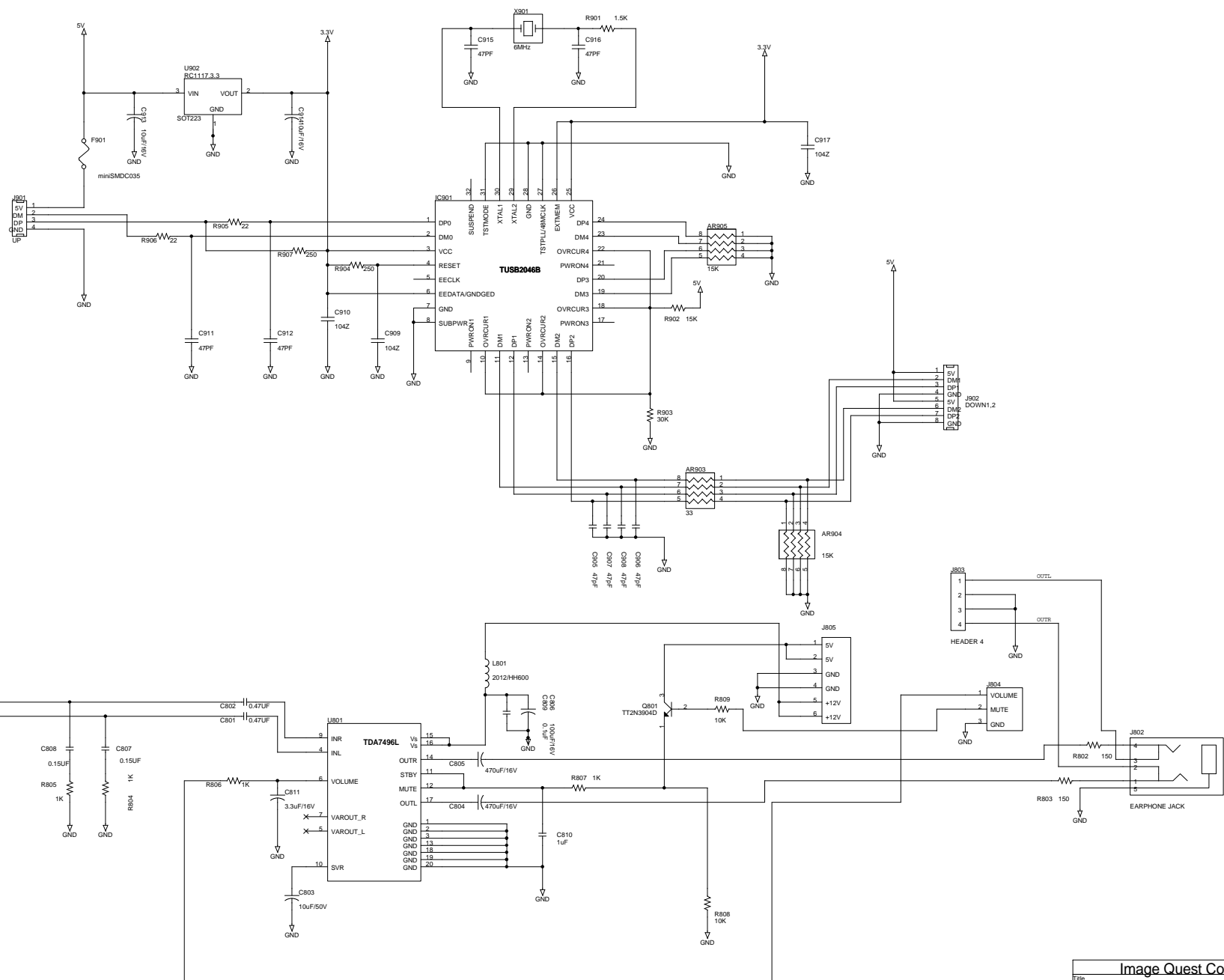
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
179	R311	RK1JC0T0101J	RES-C,100 0.063W J 1608	
180	R312	RK1JC0T0101J	RES-C,100 0.063W J 1608	
181	R315	RK1JC0T0101J	RES-C,100 0.063W J 1608	
182	R316	RK1JC0T0101J	RES-C,100 0.063W J 1608	
183	R317	RK1JC0T0473J	RES-C,47K 0.063W J 1608	
184	R318	RK1JC0T0473J	RES-C,47K 0.063W J 1608	
185	R319	RK1JC0T0101J	RES-C,100 0.063W J 1608	
186	R320	RK1JC0T0101J	RES-C,100 0.063W J 1608	
187	R321	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
188	R322	RK1JC0T0473J	RES-C,47K 0.063W J 1608	
189	R325	RK1JC0T0000J	RES-C,0 0.063W J 1608	
190	R326	RK1JC0T0000J	RES-C,0 0.063W J 1608	
191	R327	RK1JC0T0000J	RES-C,0 0.063W J 1608	
192	R328	RK1JC0T0000J	RES-C,0 0.063W J 1608	
193	R329	RK1JC0T0000J	RES-C,0 0.063W J 1608	
194	R330	RK1JC0T0000J	RES-C,0 0.063W J 1608	
195	R331	RK1JC0T0000J	RES-C,0 0.063W J 1608	
196	R332	RK1JC0T0000J	RES-C,0 0.063W J 1608	
197	R400	RK1JC0T0000J	RES-C,0 0.063W J 1608	
198	R401	2601500016	RES-C,150 0.1W F 1608	
199	R402	2601500016	RES-C,150 0.1W F 1608	
200	R500	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
201	R501	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
202	R502	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
203	R503	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
204	R504	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
205	R505	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
206	R506	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
207	R507	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
208	R508	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
209	R509	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
210	R510	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
211	R511	RK1JC0T0102J	RES-C,1K 0.063W J 1608	
212	R512	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
213	R513	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
214	R514	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
215	R515	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
216	R516	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
217	R517	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
218	R518	RK1JC0T0331J	RES CHIP 330 5% 1/16W	
219	R519	RK1JC0T0331J	RES CHIP 330 5% 1/16W	
220	R520	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
221	R521	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
222	R522	RK1JC0T0471J	RES-C,470 0.063W J 1608	
223	R523	RK1JC0T0471J	RES-C,470 0.063W J 1608	

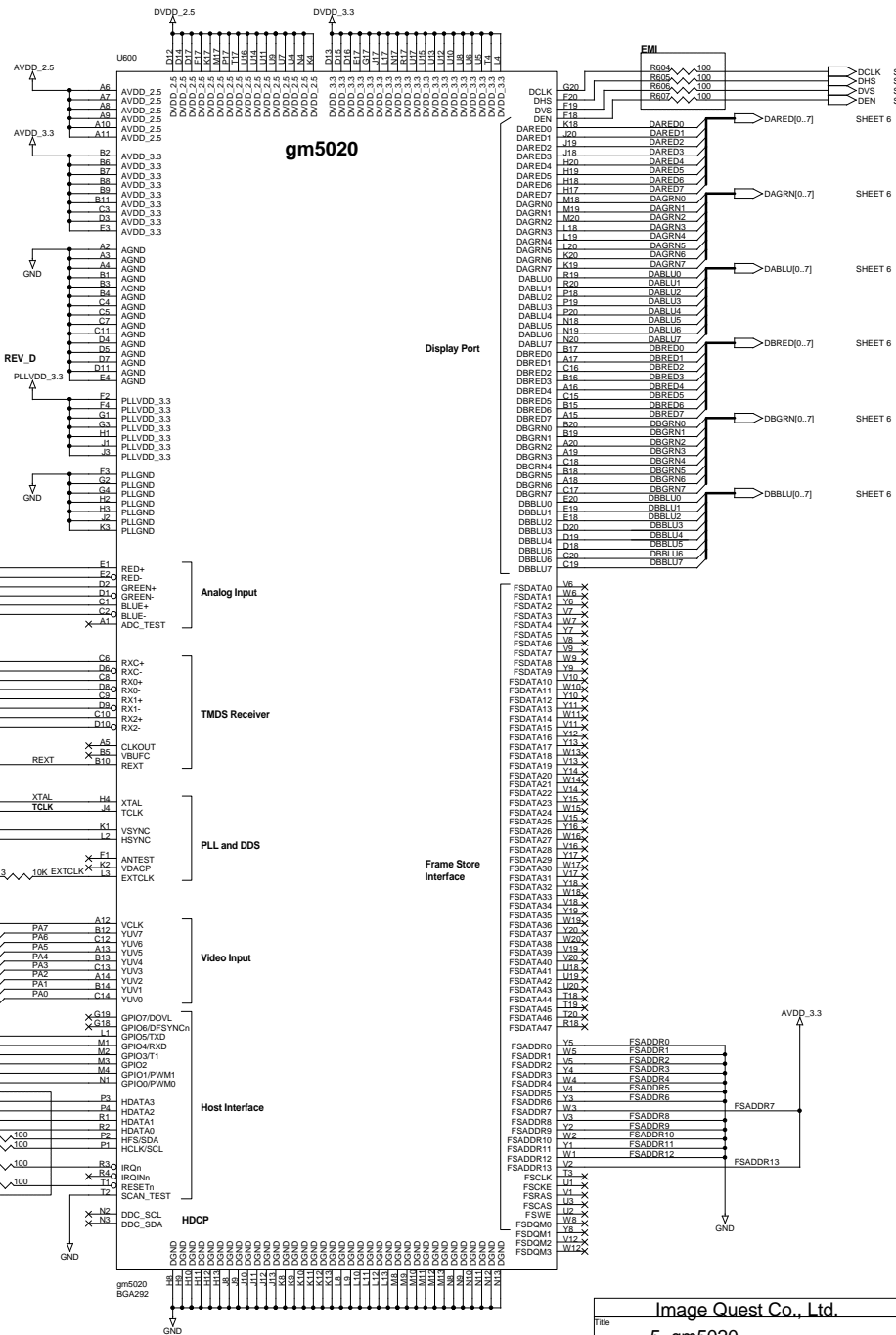
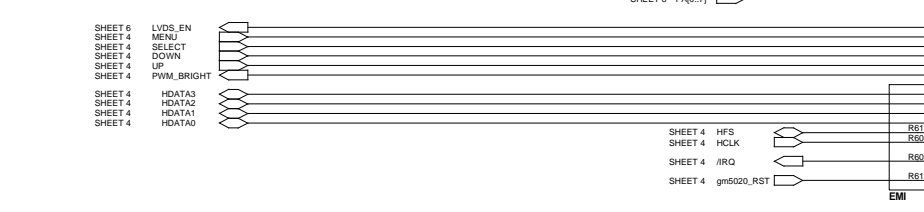
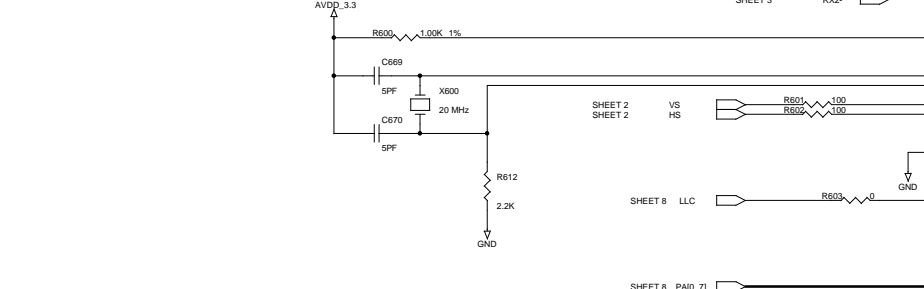
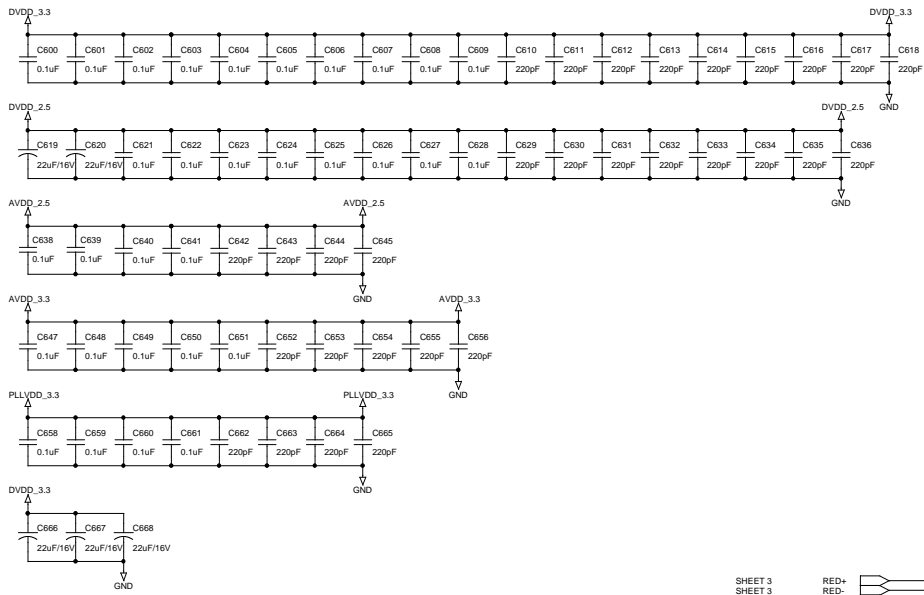
NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
224	R525	RK1JC0T0000J	RES-C,0 0.063W J 1608	
225	R527	RK1JC0T0102J	RES-C,1K 0.063W J 1608	
226	R600	2601001019	RES-C,1K 0.063W F 1608	
227	R601	RK1JC0T0101J	RES-C,100 0.063W J 1608	
228	R602	RK1JC0T0101J	RES-C,100 0.063W J 1608	
229	R603	RK1JC0T0000J	RES-C,0 0.063W J 1608	
230	R604	RK1JC0T0101J	RES-C,100 0.063W J 1608	
231	R605	RK1JC0T0101J	RES-C,100 0.063W J 1608	
232	R606	RK1JC0T0101J	RES-C,100 0.063W J 1608	
233	R607	RK1JC0T0101J	RES-C,100 0.063W J 1608	
234	R608	RK1JC0T0101J	RES-C,100 0.063W J 1608	
235	R609	RK1JC0T0101J	RES-C,100 0.063W J 1608	
236	R610	RK1JC0T0101J	RES-C,100 0.063W J 1608	
237	R611	RK1JC0T0101J	RES-C,100 0.063W J 1608	
238	R612	RK1JC0T0222J	RES CHIP 2.2K 5% 0.063W	
239	R613	RK1JC0T0103J	RES-C,10K 0.063W J 1608	
240	R700	RK1JC0T0330J	RES-C,33 0.063W J 1608	
241	R701	RK1JC0T0330J	RES-C,33 0.063W J 1608	
242	R702	RK1JC0T0330J	RES-C,33 0.063W J 1608	
243	R703	RK1JC0T0330J	RES-C,33 0.063W J 1608	
244	R704	RK1JC0T0472J	RES CHIP 4.7K 5% 1/16W	
245	U300	3203000745	IC-MEMO,24LC211/SN SOI	
246	U301	3203000745	IC-MEMO,24LC211/SN SOI	
247	U302	3202001505	IC-TTL,74LCX14M14A SOI	
248	U400	3200001462	IC-LIN,RC1117ST-2.5 SOT	
249	U401	3200001554	IC-LIN,RC1587 3A ADJ SOT	
250	U402	3200001392	IC-LIN,RC1117-3.3 SOT	
251	U403	3200001392	IC-LIN,RC1117-3.3 SOT	
252	U501	3203000879	IC-MEMO,S524A60X81 -SCB0	
253	U502	3205001387	IC-U,MTV312M64 LCC MONIT	
254	U502	3721100621	CONN-F,PLL-44-PPS-T-M 44	
255	U600	3205001383	IC-U,GM5020 BGA SCALER C	
256	U700	3202001511	IC-TTL,CS5828 TSOP2	
257	U701	3202001511	IC-TTL,CS5828 TSOP2	
258	U702	3114000127	FET,SI4435DY SMD	
259	X500	3530200537	VIB-QUARTZ,SX-1 12MHZ SM	
260	X600	3530200573	VIB-QUARTZ,SMD 20MHZ 18P	
261		6201310300	COVER FRONT,Q17	
262		6201310400	COVER REAR,Q17	
263		6215239900	KNOB OSD,Q17	
264		3010700814	CONTROL B/D OSD ASSY,Q17	
265		3010700815	USB B/D ASS'Y,Q17	
266		3041001049	PCB-DOUBLE,Q17 MAIN F4	
267		3330500245	LCD,17",HT17E11-300 T	
268		3550100113	SPEAKER ASSY,Q17	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
269		3610200107	PWR-LIN-SPPLY,Q17 12V/5V	
270		3610400253	INVERTER,Q17	
271		3725005253	CONN-A,LVDS CABLE Q17 30	
272		3725005254	CONN-A,INVERTER CABLE Q1	
273		3725005255	CONN-A,POWER CABLE Q17 6	
274		3725005256	CONN-A,DVI+D-SUB+POWER C	
275		3725005259	CONN-A,AC INLET ASS'Y Q1	
276		3758000200	CBL-PWR,MW WALL 1.8MT EU	
277		3758500416	CBL-SGN,AUDIO INPUT CABL	
278		3758500425	CBL-SGN,7PAI 1.5M 2C MW	
279		5001000622	SCR-MC,FLT + MC 4*8	
280		5001000666	SCR-MC,BIN + MC 3*5	
281		5001000666	SCR-MC,BIN + MC 3*5	
282		5001000669	SCR-MC,WAL + PAN 4X6	
283		5004000191	SCR-TT,BIN + MC 3*12	
284		5004000191	SCR-TT,BIN + MC 3*12	
285		5004000205	SCR-TT,PAN + MC 2X5	
286		5004000211	SCR-TT,FLT + TT2 4X8	
287		5004000211	SCR-TT,FLT + TT2 4X8	
288		6101220000	FRAME BASE,Q17	
289		6110278200	BRKT COVER REAR,Q17	
290		6110279000	BRKT REAR ASSY,Q17	
291		6115024700	HINGE ASSY,Q17	
292		6120054100	SHIELD PCB,Q17	
293		6120054200	SHIELD POWER,Q17	
294		6120054500	SHIELD PCB ASSY,Q17	
295		6128010148	GASKET EMI,7X1X30	
296		6128010149	GASKET EMI,7X1X80	
297		6128010155	GASKET EMI,4X4X50	
298		6128010156	GASKET EMI,25X5X80	
299		6128010157	GASKET EMI,7X1X130	
300		6130024300	PEM PCB,Q17	
301		6201310570	STAND FRONT,Q17 WHITE PS	
302		6201310670	STAND REAR,Q17 WHITE PS	
303		6201310770	STAND BASE,Q17 WHITE PS	
304		6201311800	STAND ASSY,Q17	
305		6201311900	COVER F.ASSY,Q17	
306		6210107112	AL TAPE,50X150 PE COATIN	
307		6210107113	AL TAPE,60X40 PE COATING	
308		6215240070	CAP SIDE L,Q17 WHITE PS	
309		6215240170	CAP SIDE R,Q17 WHITE PS	
310		6215240270	CAP STAND BASE,Q17 WHITE	
311		6215240370	CAP COVER REAR,Q17 WHITE	
312		6220085500	LENS LED,Q17	
313		6223078500	SUPPORTER PCB,Q17	

NUM.	LOCATION	PART NUMBER	DESCRIPTION	REMARK
314		6243028300	BAG,PE(ST) CLEAR 14"/15"	
315		6243037901	MANUAL PE BAG	
316		6253118300	CUSHION TOP,Q17	
317		6253118400	CUSHION BTM,Q17	
318		6261043900	RUBBER FOOT,L70A	
319		6261044200	RUBBER MODULE,12.7X7.4X2	
320		6261044200	RUBBER MODULE,12.7X7.4X2	
321		6301191400	PALLET PAD,ALL MODEL,SW-	
322		6301192100	BAND SQUARE,SW-3S527/S72	
323		6301192300	BOX CARTON,Q17	
324		6309030000	PAD,PALLET CTN PBE/U 15"	
325		6309037300	PAD,PALLET ANGLE	
326		6316332925	LABEL BACK,Q17 HIE TCO'9	
327		6316345101	STICKER CABINET,TCO '99	
328		6320230221	CD MANUAL,IQT(EXP) ALL	
329		375850041101	CBL-SGN,USB A+B CABLE 15	
330		632703520302	SHEET INSTALL GUIDE,IQT	
331		B4204513264B	LABEL,B/CODE 82KHZ(DIC54	
332		B4204668200	KIT LABEL,Q17 HIE	
333		B4210332001	KIT COVER,Q17	
334		B4210332101	LCD MEC,ASS'Y,Q17	
335		B4210332201	PCAKING ASSY,Q17	
336		B4210332301	STAND TOTAL ASSY,Q17	
337		E4205019801	MAIN ASSY,Q17 EXP	
338		E4208422011	PCBA MA(A1*),Q17	
339		E4208522001	PCBA MA(I1*),Q17	
340		E4208622001	PCBA MA(T1*),Q17	
341		M11173008012	SCREW FLT(+) M3*8 MSZPC	
342		M17744006012	SCREW,BIN(+) M4*6 MSZPC	





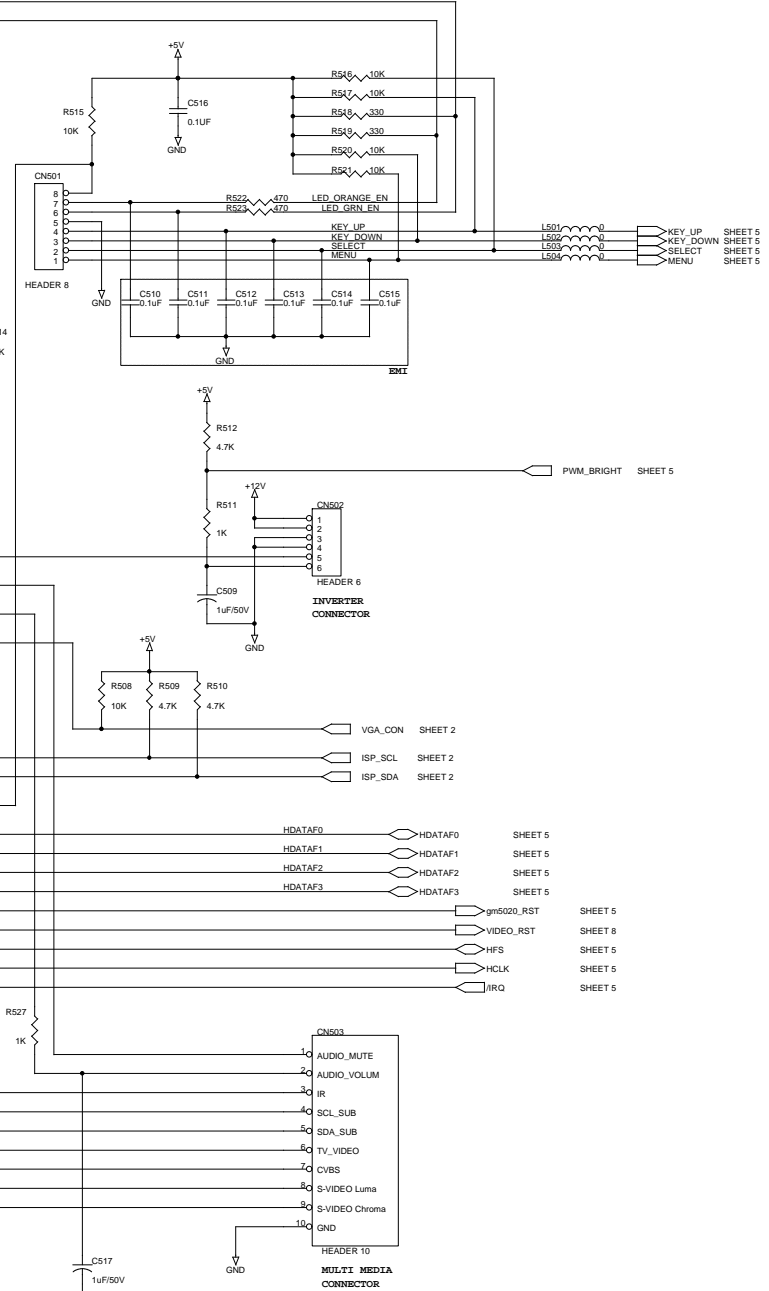
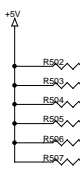
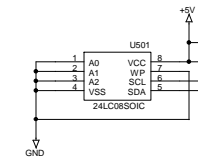
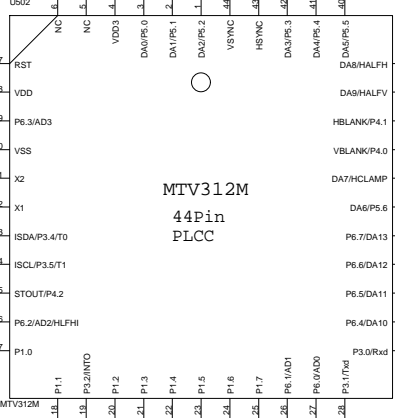
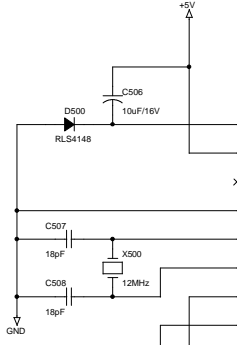
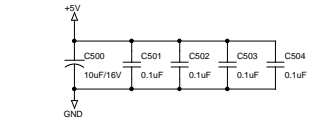


- SHEET 6 LVDS_EN
- SHEET 4 MENU
- SHEET 4 SELECT
- SHEET 4 DOWN
- SHEET 4 UP
- SHEET 4 PWM_BRIGHT
- SHEET 4 HDATA3
- SHEET 4 HDATA2
- SHEET 4 HDATA1
- SHEET 4 HDATA0

- SHEET 3 RED+
- SHEET 3 RED-
- SHEET 3 GREEN+
- SHEET 3 GREEN-
- SHEET 3 BLUE+
- SHEET 3 BLUE-
- SHEET 3 RXC+
- SHEET 3 RXC-
- SHEET 3 RX0+
- SHEET 3 RX0-
- SHEET 3 RX1+
- SHEET 3 RX1-
- SHEET 3 RX2+
- SHEET 3 RX2-

- SHEET 2 VS
- SHEET 2 HS
- SHEET 8 LLC
- SHEET 8 PA0..7

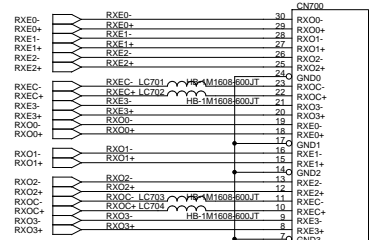
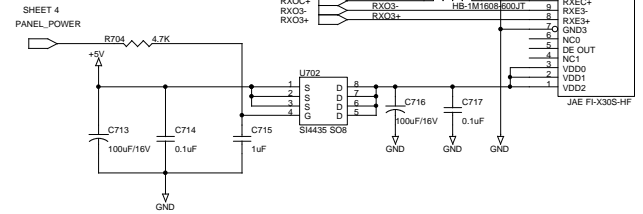
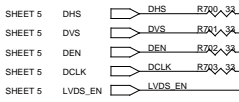
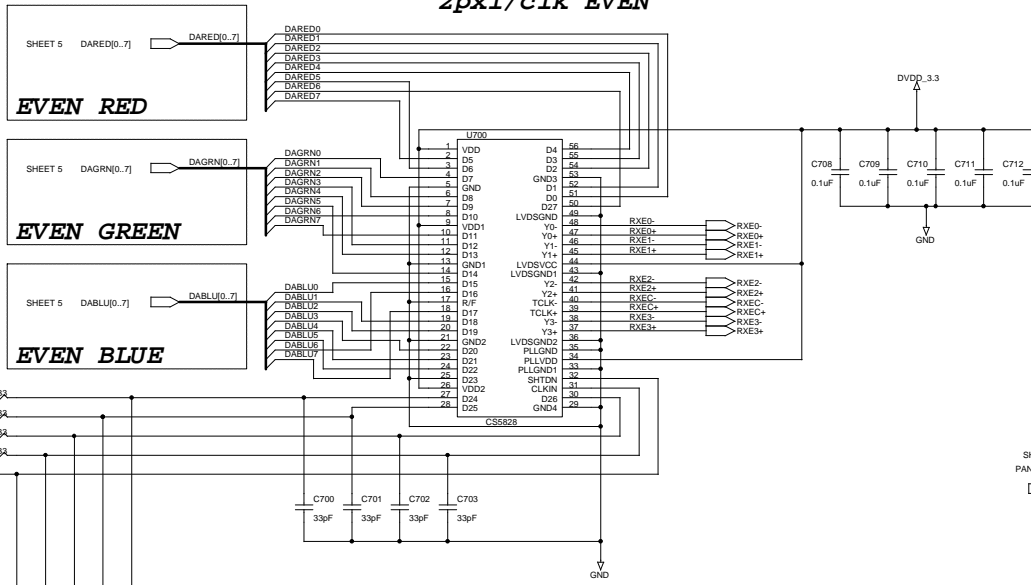
- SHEET 4 HFS
- SHEET 4 HCLK
- SHEET 4 /IRQ
- SHEET 4 gm5020_RST



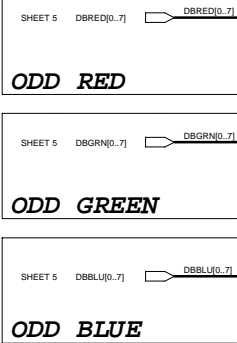
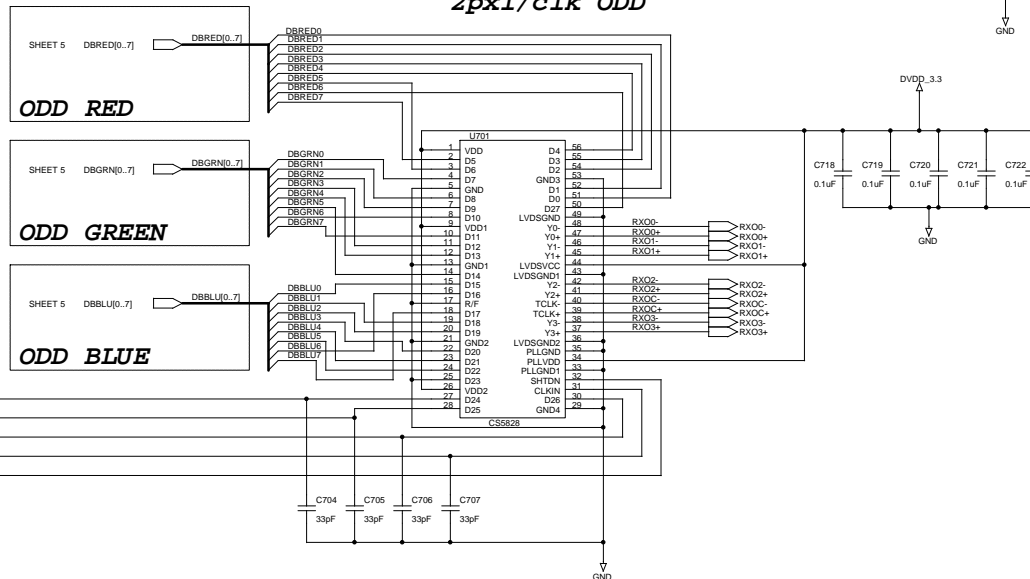
SHEET 8 VIDEO_SCL
SHEET 8 VIDEO_SDA

Title		4. MCU(MTV312M)	
Size	C	Document Number	Q17
Date	Monday, November 11, 2008	Sheet	5 of 8

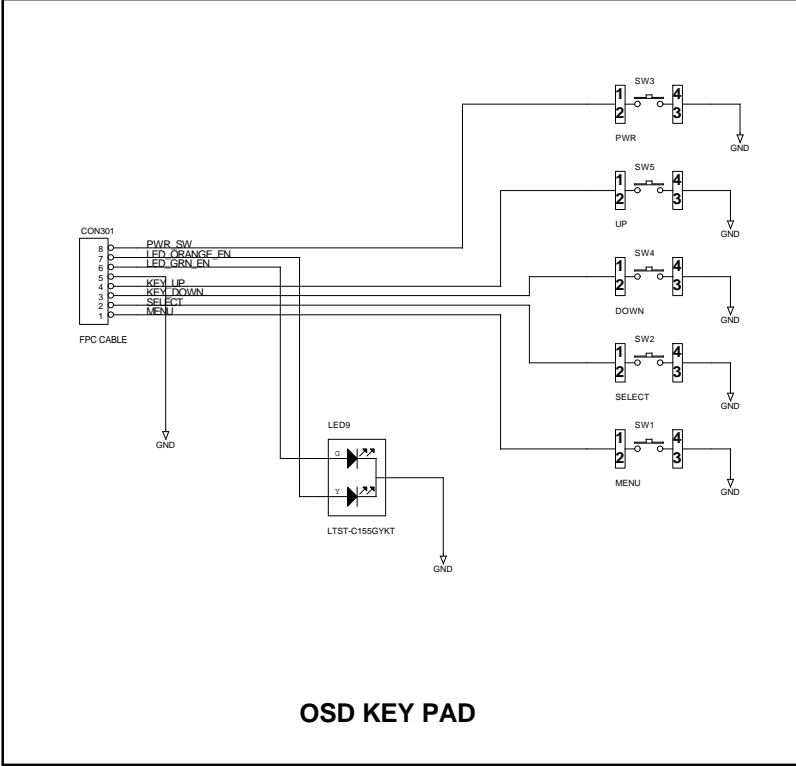
2px1/c1k EVEN



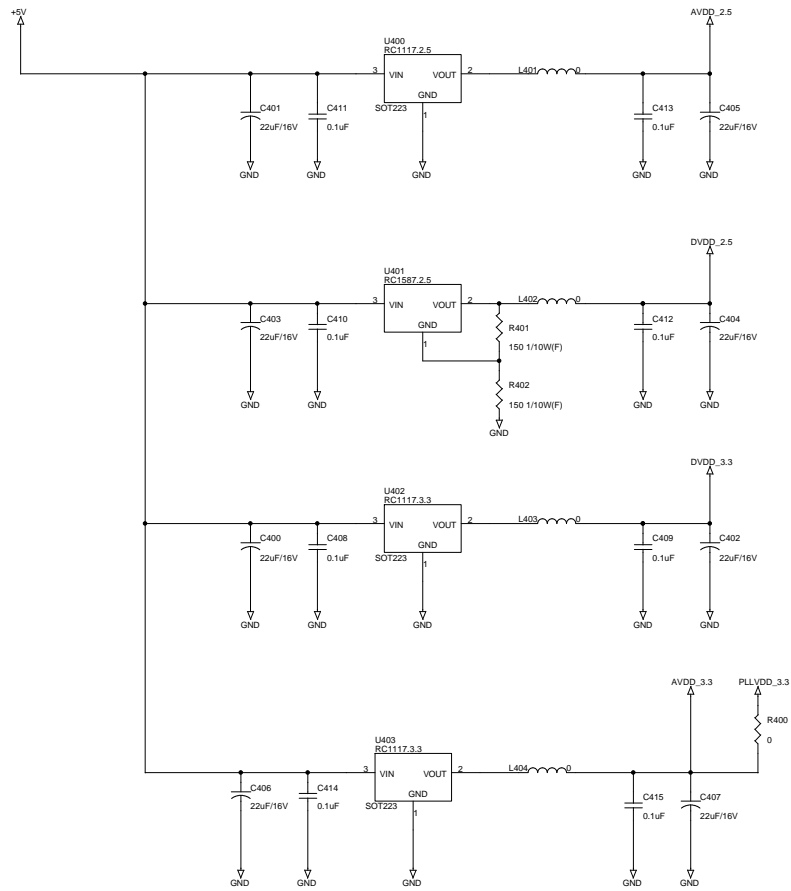
2px1/c1k ODD

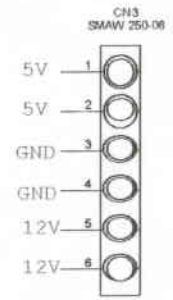
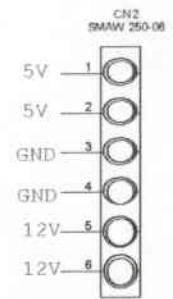
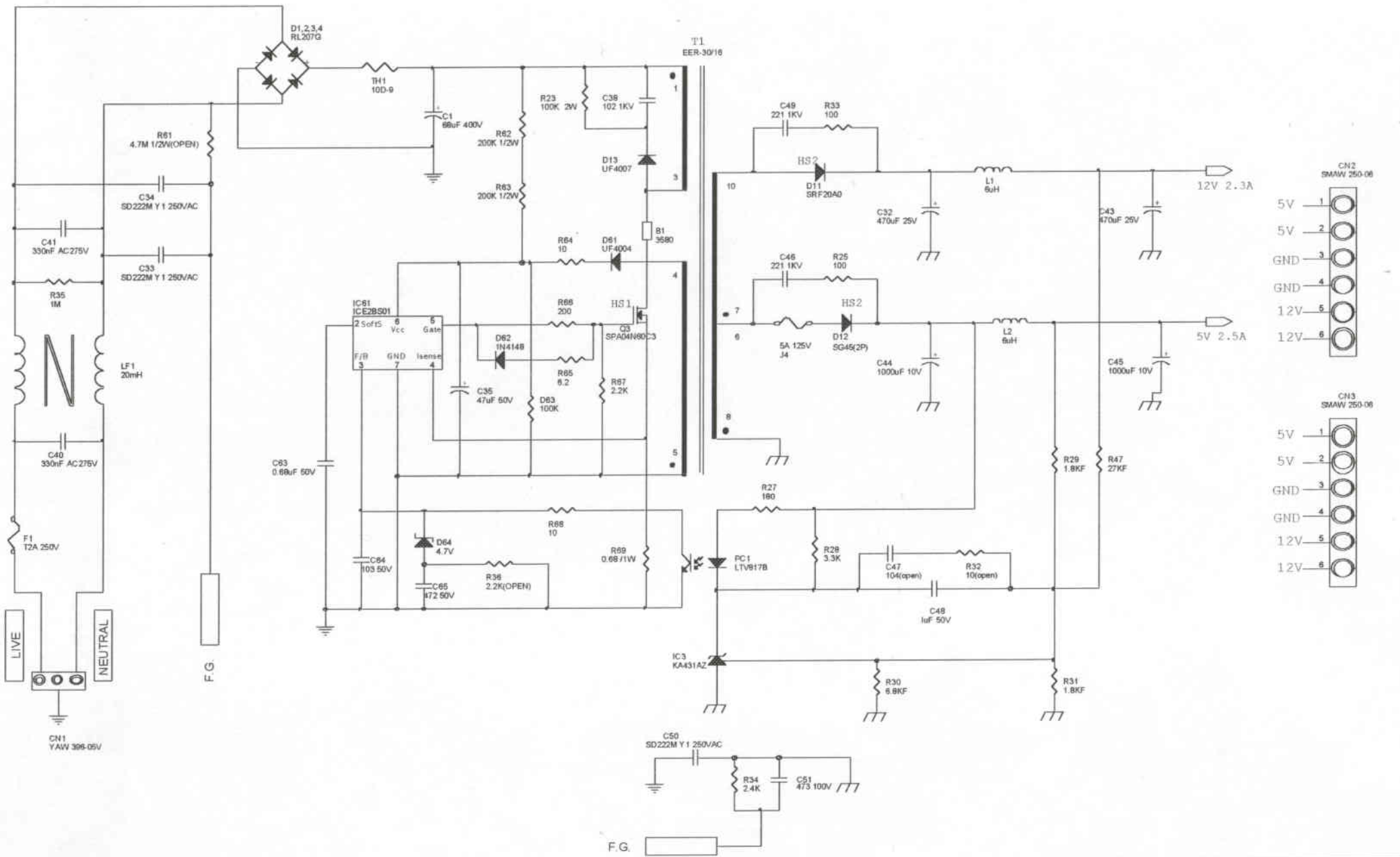


1. NC MEANS NOT CONNECTED ON PCB BOARD.
2. RESISTANCE IS SHOWN IN OHM K=1,000 M=1,000,000 RATED POWER OF RESISTOR NOT NOTED IN SCHEMATIC DIAGRAM IS 1/16W CHIP (5%)
3. CAPACITANCE IS SHOWN pF AND NOTED CAPACITANCES IS SHOWN uF. uF=1,000,000pF RATED VOLTAGE OF CONDENSER NOT NOTED IN SCHEMATIC DIAGRAM IS 50V.



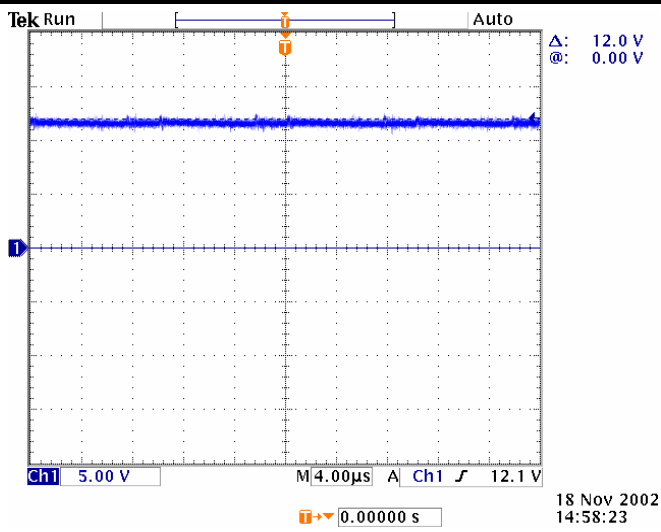
OSD KEY PAD



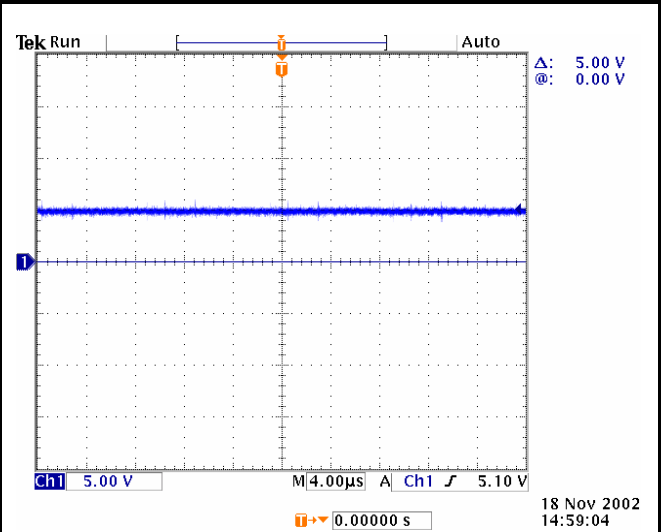


Title	ImageQuest 17" LCD Power	
Size	Document Number	Rev
A3		0.3
Date:	Wednesday, October 16, 2002	Sheet 1 of 1

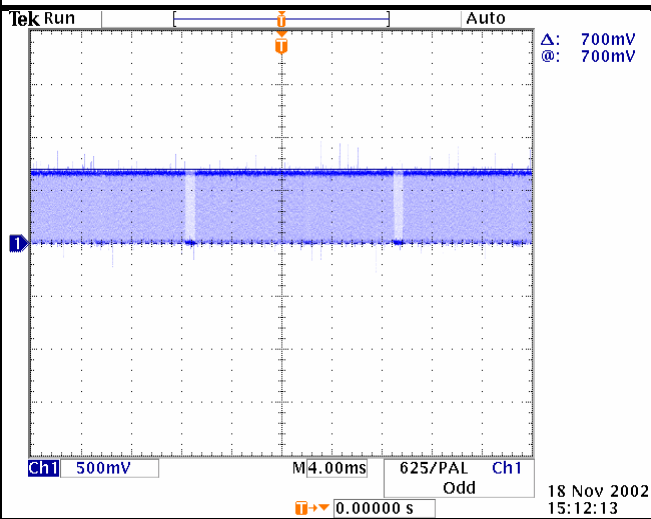
1.C32(+) .12V



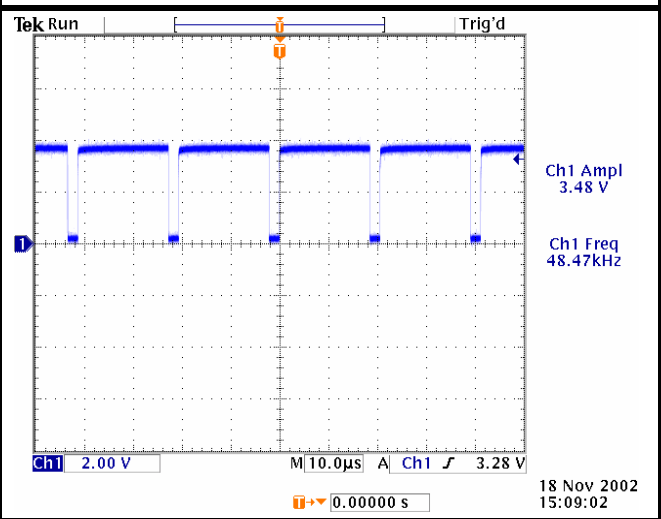
2.C44(+). 5V



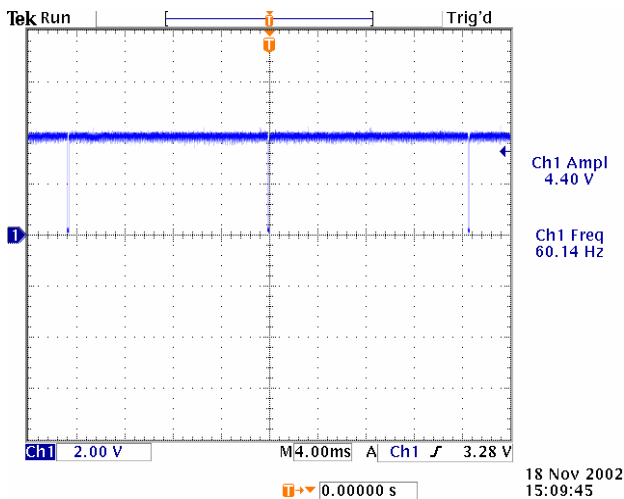
3.CN301 PIN.12(RED)



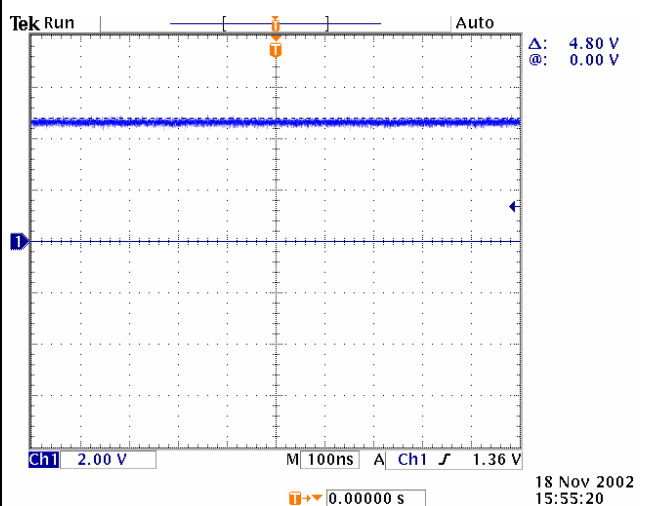
4.CN301 PIN.7(HS)



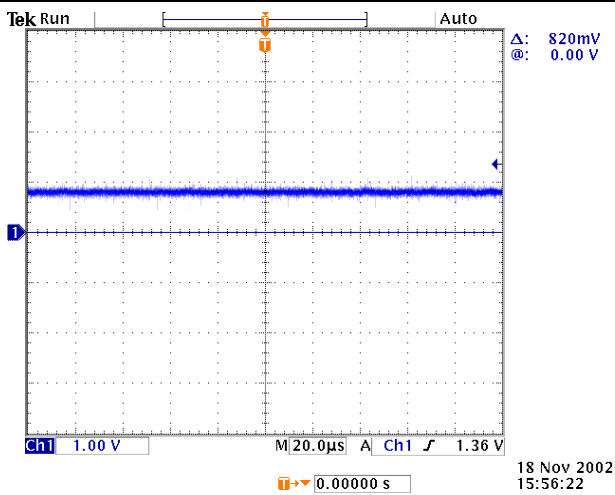
5.CN301 PIN.5(VS)



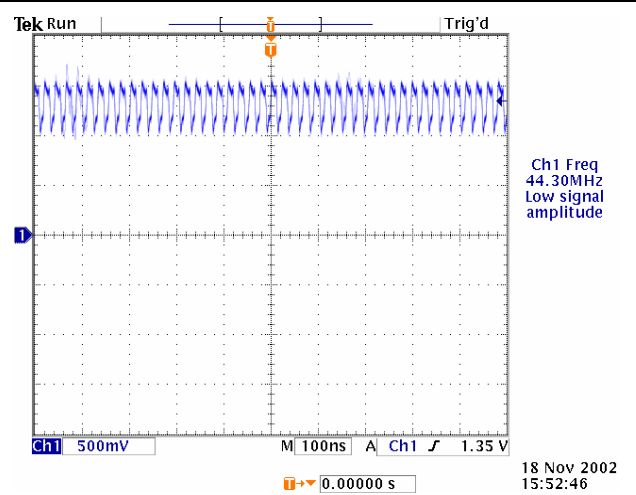
6.CN502 PIN.5(INVERTER ON/OFF)



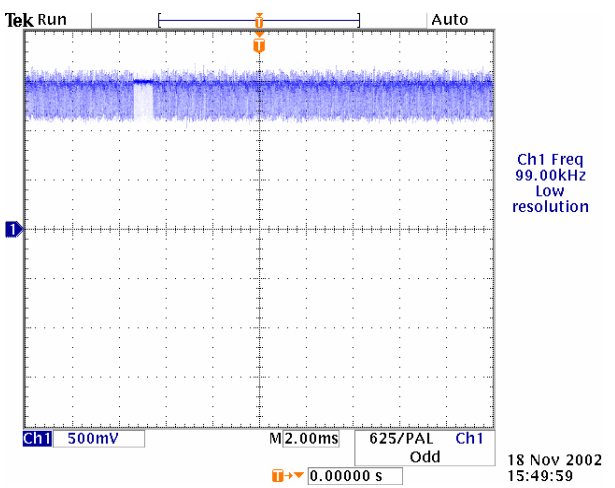
7. CN502 PIN.6(BRIGHTNESS)



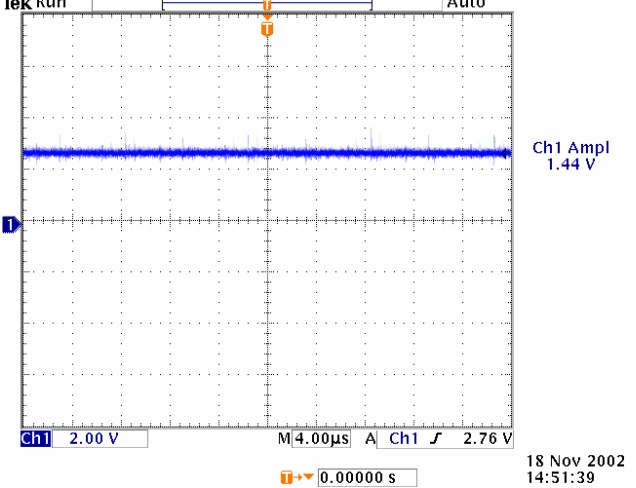
8. CN700 PIN.22(RXOC+)



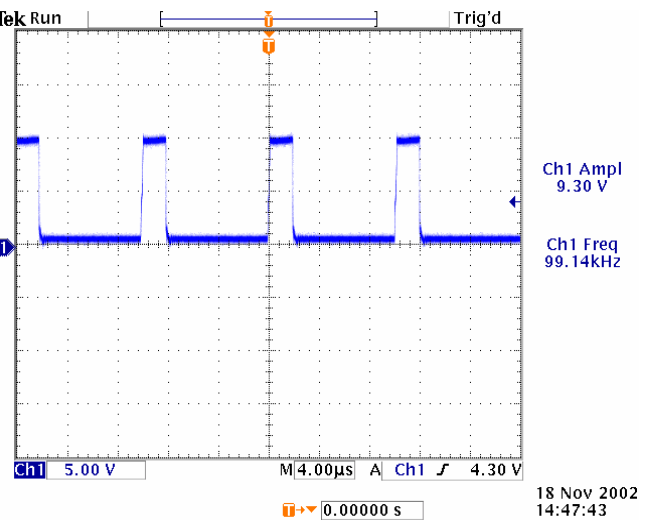
9. CN700 PIN.22(RXEO-)



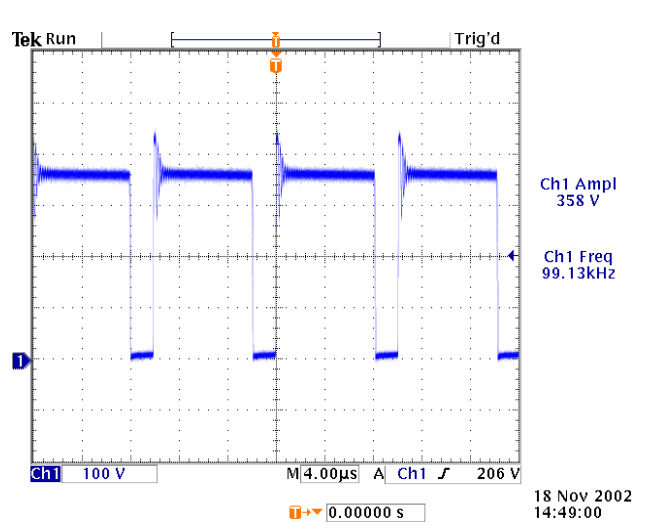
10. IC61 PIN.3



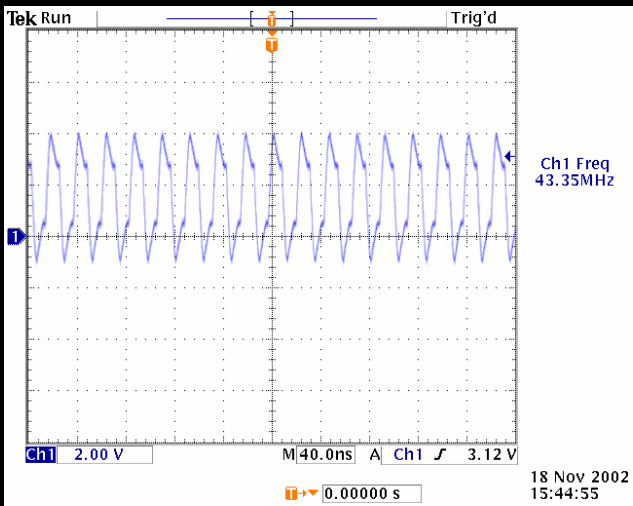
11. IC61 PIN.5



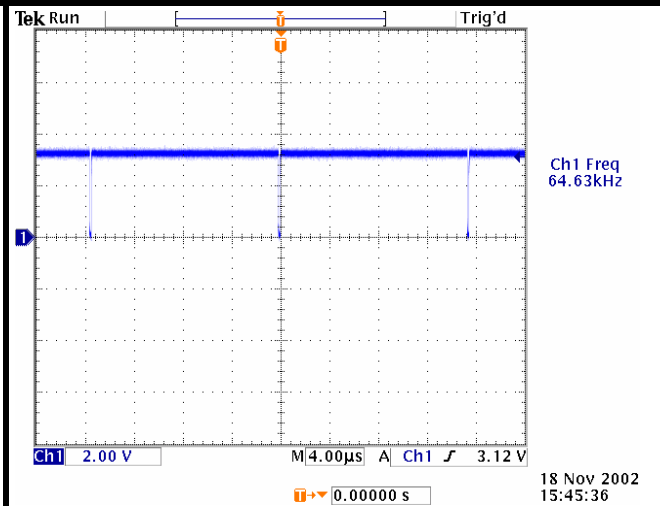
12. Q3 DRAIN



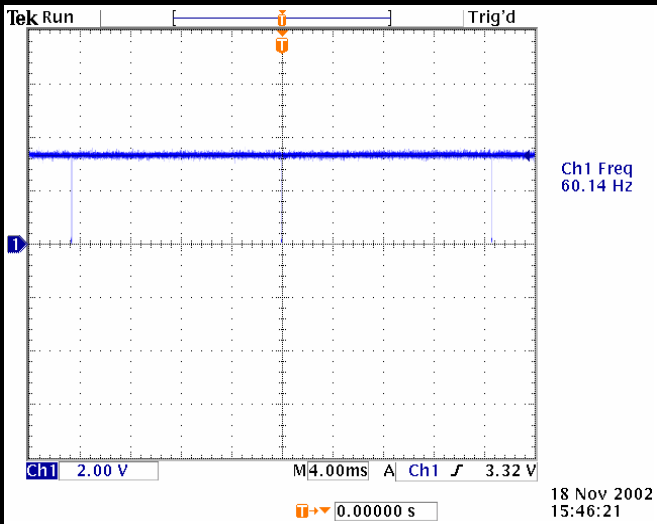
13.R604(DCLK)



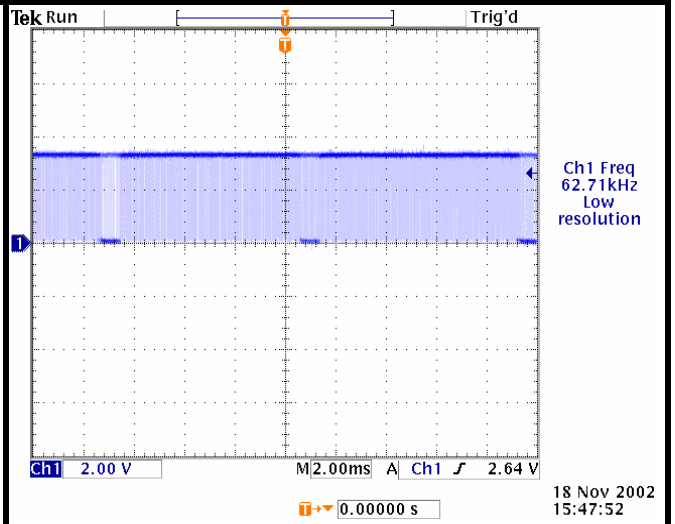
14.R605(DHS)



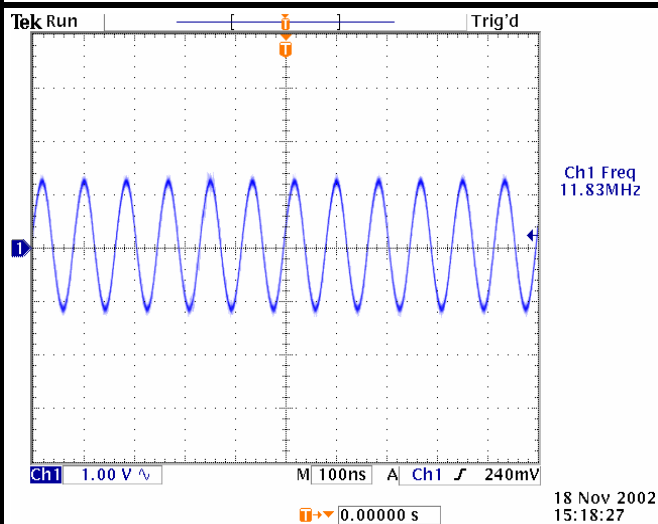
15.R606(DVS)



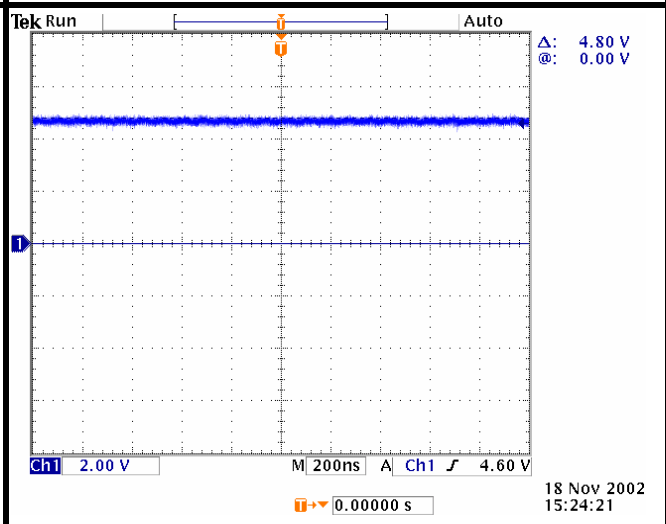
16.R607(DEN)



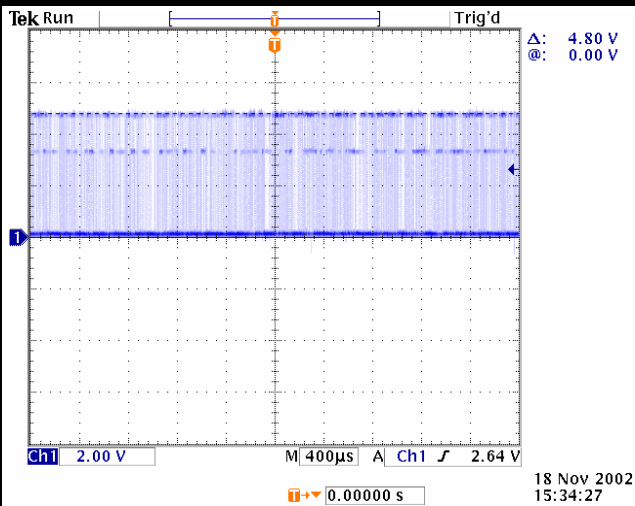
17.U502 PIN.12(X1)



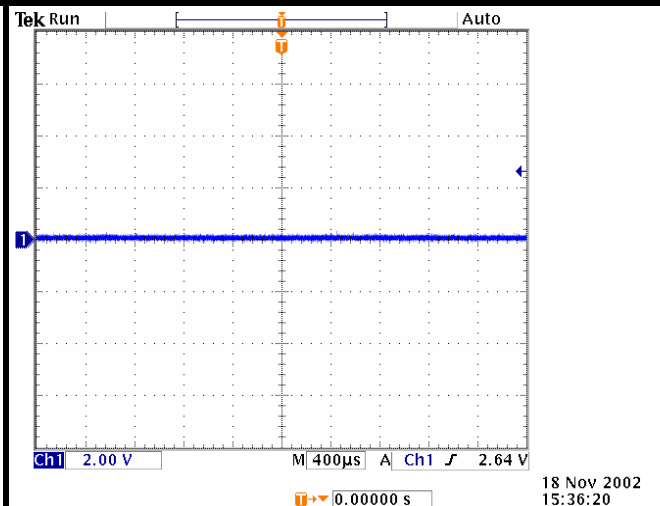
18.U502 PIN.13(SDA)



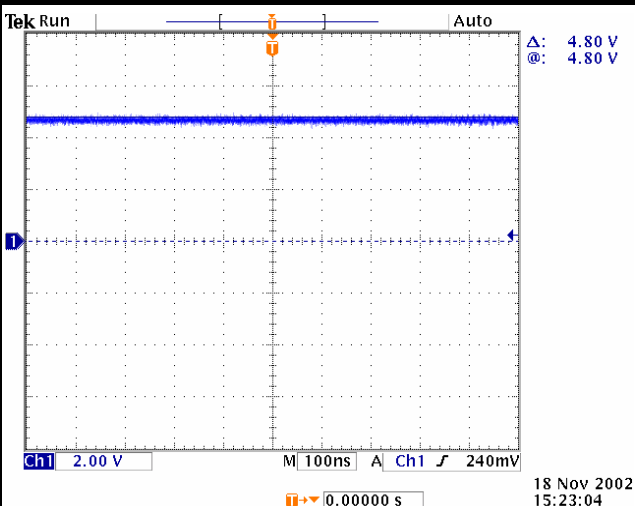
19.U502 PIN.17(HDATAF0)



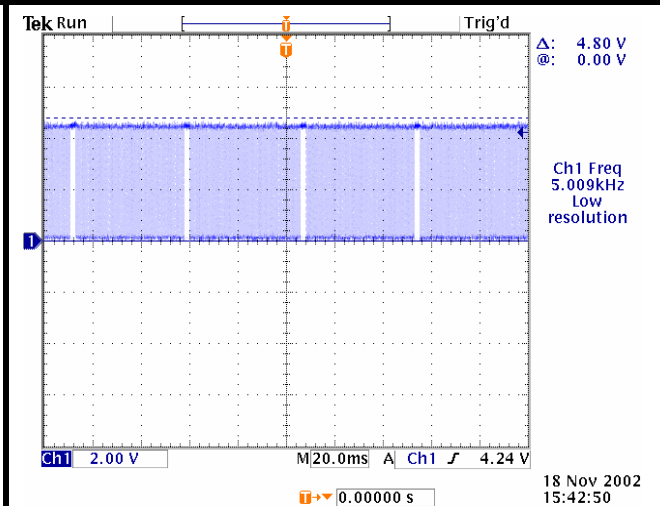
20.U502 PIN.19(IRQ)



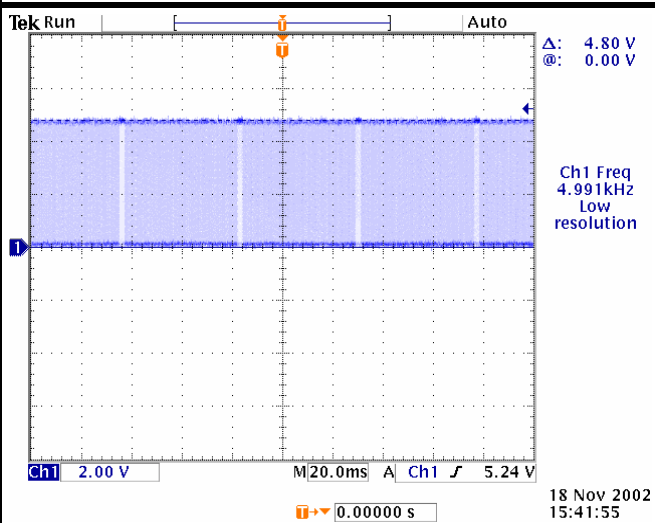
21.U502 PIN.8(VDD)



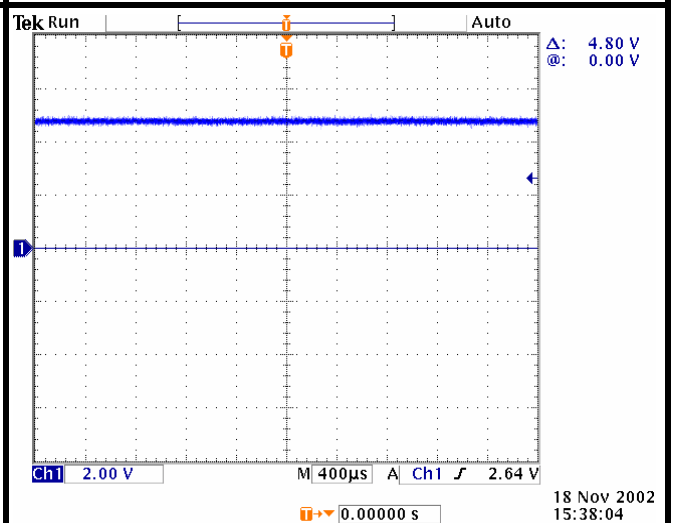
22.U502 PIN.22(HCLK)



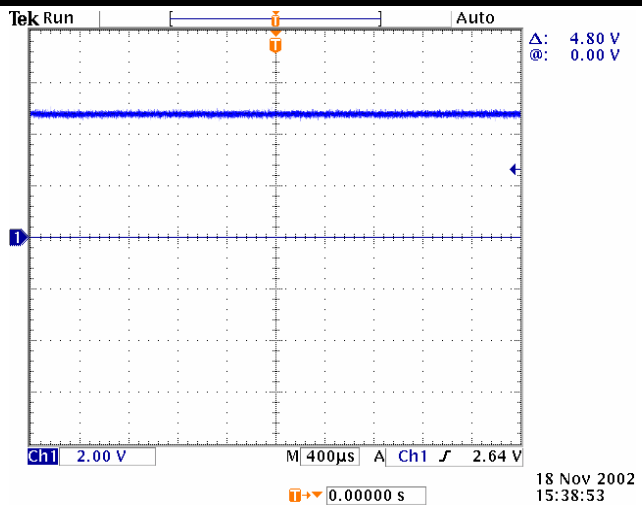
23.U502 PIN23(HFS)

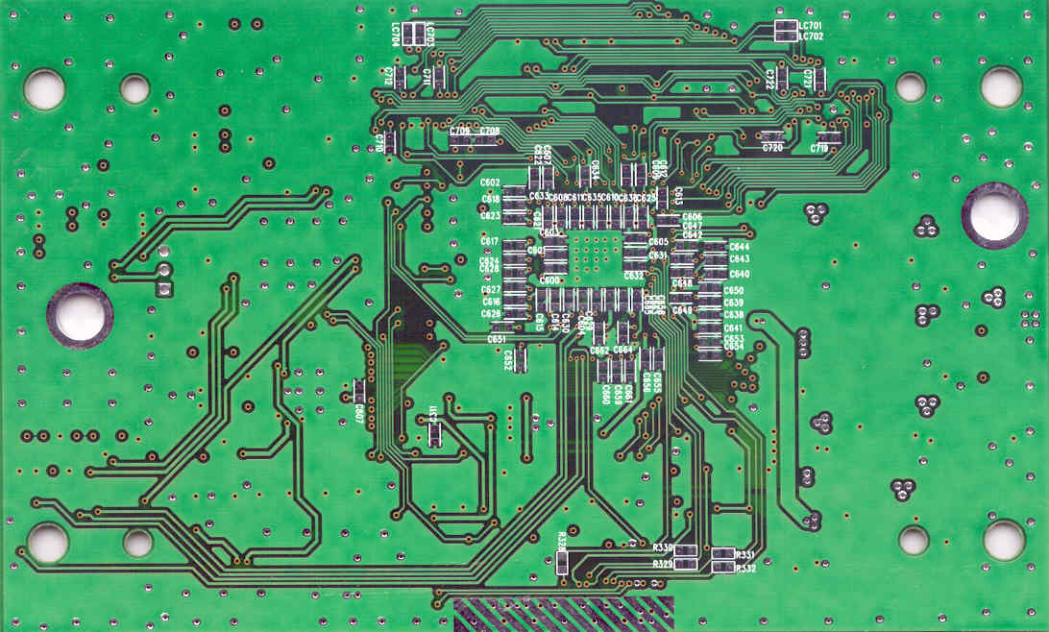


24.U502 PIN.24(RST)



25.U502 PIN.26(VIDEO-RST)





LC701
LC702

LC701
LC702

C718
C719

C722
C723

C709
C708

C720

C719

C602

C610

C623

C617

C624

C625

C627

C616

C628

C651

C652

C653

C654

C655

C656

C657

C658

C659

C660

C661

C662

C663

C664

C665

C666

C667

C668

C669

C670

C671

C672

C673

C674

C675

C676

C677

C678

C679

C680

C681

C682

C683

C684

C685

C686

C687

C688

C689

C690

C691

C692

C693

C694

C695

C696

C697

C698

C699

C700

C701

C702

C703

C704

C705

C706

C707

C708

C709

C710

C711

C712

C713

C714

C715

C716

C717

C718

C719

C720

C721

C722

C723

C724

C725

C726

C727

C728

C729

C730

C731

C732

C733

C734

C735

C736

C737

C738

C739

C740

C741

C742

C743

C744

C745

C746

C747

C748

C749

C750

C751

C752

C753

C754

C755

C756

C757

C758

C759

C760

C761

C762

C763

C764

C765

C766

C767

C768

C769

C770

C771

C772

C773

C774

C775

C776

C777

C778

C779

C780

C781

C782

C783

C784

C785

C786

C787

C788

C789

C790

C791

C792

C793

C794

C795

C796

C797

C798

C799

C800

C801

C802

C803

C804

C805

C806

C807

C808

C809

C810

C811

C812

C813

C814

C815

C816

C817

C818

C819

C820

C821

C822

C823

C824

C825

C826

C827

C828

C829

C830

C831

C832

C833

C834

C835

C836

C837

C838

C839

C840

C841

C842

C843

C844

C845

C846

C847

C848

C849

C850

C851

C852

C853

C854

C855

C856

C857

C858

C859

C860

C861

C862

C863

C864

C865

C866

C867

C868

C869

C870

C871

C872

C873

C874

C875

C876

C877

C878

C879

C880

C881

C882

C883

C884

C885

C886

C887

C888

C889

C890

C891

C892

C893

C894

C895

C896

C897

C898

C899

C900

C901

C902

C903

C904

C905

C906

C907

C908

C909

C910

C911

C912

C913

C914

C915

C916

C917

C918

C919

C920

C921

C922

C923

C924

C925

C926

C927

C928

C929

C930

C931

C932

C933

C934

C935

C936

C937

C938

C939

C940

C941

C942

C943

C944

C945

C946

C947

C948

C949

C950

C951

C952

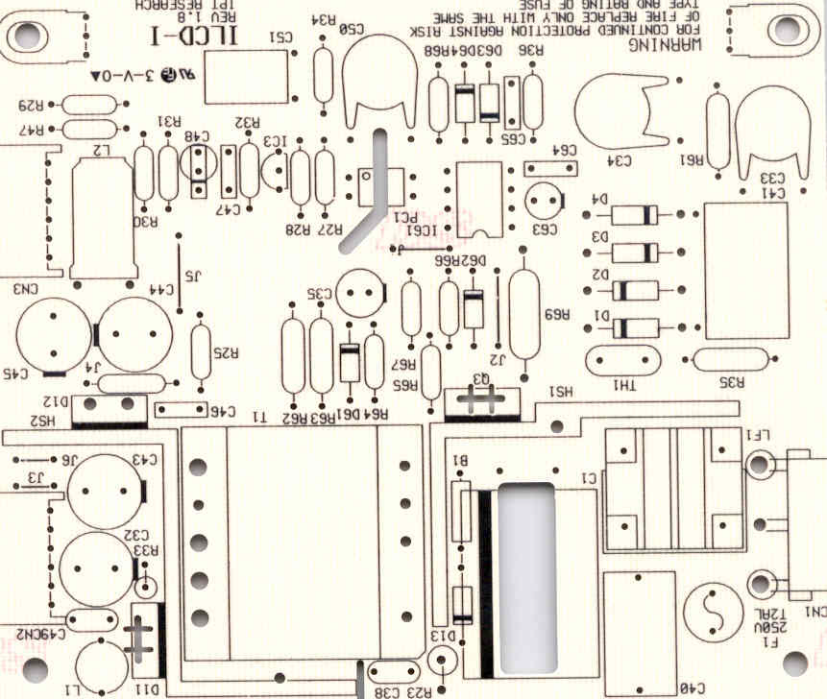
C953

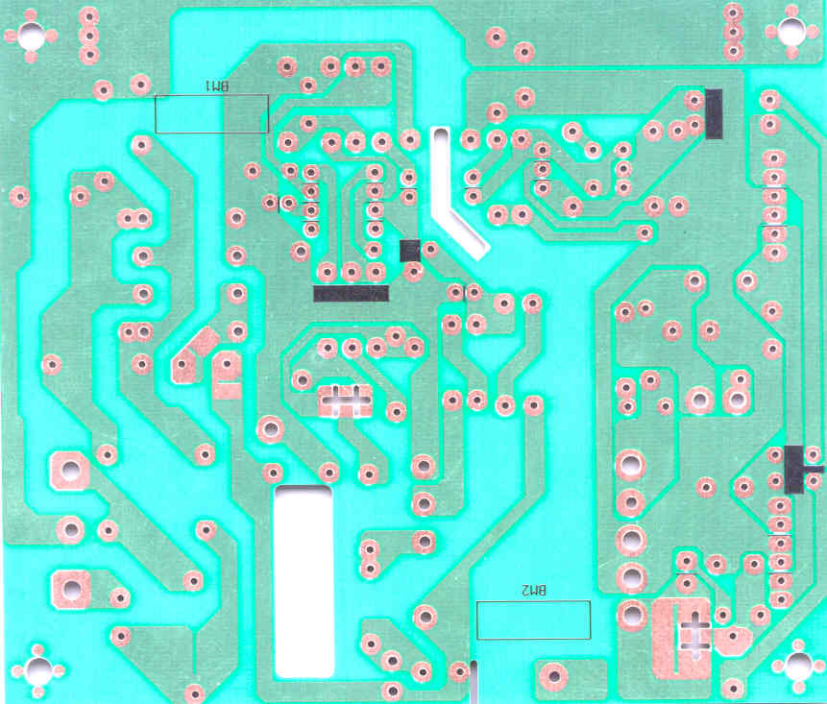
C954

C955

C956

C957





BM1

BM2

