ISEE INTEGRATION SOFTWARE ELECTRONIC ENGINEERING

IGEP™ TECHNOLOGY

IGEP ™ COM MODULE DM3730/AM3703

HARDWARE REFERENCE MANUAL

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http://www.isee.biz

3 OVERVIEW

3.1 ORDERING INFORMATION

IGEP™ Device	Reference	Description
IGEP™ COM MODULE DM3730 WIFI	IGEP0030-RG60	DM3730 Processor, 512MB RAM, 512 MB NandFlash, with WIFI/Bluetooth
IGEP™ COM MODULE DM3730 NO WIFI	IGEP0030-RG70	DM3730 Processor, 512MB RAM, 512 MB NandFlash, without WIFI/Bluetooth
Customized models		
IGEP™ COM MODULE AM3703 WIFI	IGEP0030-RG2x	AM3703 Processor, 512MB RAM, 512 MB NandFlash, with WIFI/Bluetooth
IGEP™ COM MODULE AM3703 NO WIFI	IGEP0030-RG8x	AM37030 Processor, 512MB RAM, 512 MB NandFlash, without WIFI/Bluetooth
Expansion Boards		
IGEP™ BERLIN	BASE0010-RB3	Expansion Board for fast prototyping of user´s project
IGEP™ NEW YORK	ILMS0015-RA2	Expansion Board for fast prototyping of user´s project

Table 1 Ordering information

Data matrix is located above micro-SD card holder:

Figure 1 IGEP™ COM MODULE DM3730/AM3703 RG version matrix location

3.2 ABOUT THIS MANUAL

This manual describes IGEP™ COM MODULE DM3730/AM3703 version RG hardware features. IGEP™ COM MODULE DM3730/AM3703 COMs are IGEP™ technology devices from ISEE. You can find additional information at our website www.isee.biz

The "OVERVIEW" chapter describes general features of these COM boards and show the block diagrams. The "ON-BOARD DEVICES & INTERFACES" chapter describes in more detail each device and interface connectors included on these products. "EXPANSION CONNECTORS INTERFACES: J1 & J4" chapter describes in detail the function of each pin of the expansion connector included on these boards. "DEVELOPING A BASE BOARD" chapter describes some expansion boards available for IGEP™ COM MODULE DM3730/AM3703 boards that helps you to develop a custom base board. "MECHANICAL SPECIFICATIONS" chapter describes the mechanical characteristics of these products and finally chapter "ELECTRICAL CHARACTERISTICS" show a table with the electrical specifications of these products.

At the end of this document you will find a list of tables, figures and change log. You will find these elements in chapters: "LIST OF TABLES", "LIST OF FIGURES", "KNOWN ISSUES", "TROUBLESHOOTING" and "CHANGE HISTORY".

THIS MANUAL ONLY REFERS TO IGEP™ COM MODULE DM3730/AM3703 RG VERSION. HARDWARE MANUAL REVISION 2.0 REFERS TO IGEP™ COM MODULE DM3730/AM3703 LEGACY RE VERSION

3.3 IGEP™ COM MODULE DM3730/AM3703 DESCRIPTION

IGEP™ COM MODULE DM3730/AM3703 are embedded processor computer on modules (COMs) based on Texas Instruments DM3730/AM3703 processors.

IGEP™ COM MODULE DM3730	IGEP™ COM MODULE AM3703

• Texas Instruments DM3730 processor @1 GHz
  ○ DSP TMS320DM-C64+ @800 MHz
  ○ NEON SIMD Coprocessor
  ○ Video Acceleration
  ○ Camera Interface
• RAM 512 MBytes LPDDR SDRAM @200 MHz
• NAND Flash 512 MBytes
• On board micro-SD socket
• Designed for industrial and commercial purposes.
• USB OTG 2.0 on mini AB connector
• LED Indicators
• Size: 18x68,5 mm
	• Texas Instruments AM3703 processor @1 GHz
	  ○ NEON SIMD Coprocessor
	  ○ Camera Interface
	• RAM 256 MBytes LPDDR SDRAM @200 MHz
	• NAND Flash 512 MBytes
	• On board micro-SD socket
	• Designed for industrial and commercial purposes.
	• USB OTG 2.0 on mini AB connector
	• LED Indicators
	• Size: 18x68,5 mm

• J5: Camera interface
• J1 and J4: Expansion interface
• Non-populated parts:
  ○ J7: Expansion interface II
• WIFI & Bluetooth
• J2: External WIFI antenna connector
	• J5: Camera interface
	• J1 and J4: Expansion interface
	• Non-populated parts:
	  ○ J7: Expansion interface II

IGEP™ COM MODULE DM3730 RG version Top View

IGEP™ COM MODULE DM3730 RG version Bottom View

Figure 2 IGEP™ COM MODULE DM3730 RG version View

IGEP™ COM MODULE AM3703 RG version Top View

IGEP™ COM MODULE AM3703 RG version Bottom View

Figure 3 IGEP™ COM MODULE AM3703 RG version View

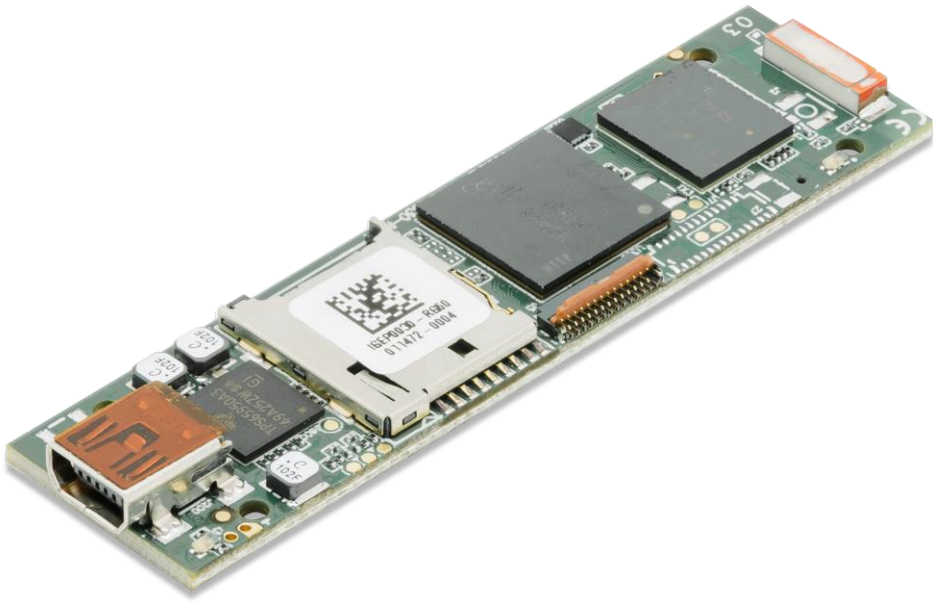

Figure 4 IGEP™ COM MODULE DM3730 RG version GENERAL VIEW

3.4 IGEP™ COM MODULE DM3730/AM3703 FEATURES

Feature	IGEP™ COM MODULE DM3730 Specifications	IGEP™ COM MODULE AM3703 Specifications
ARM CPU	Texas Instruments DM3730 @1 GHz L1 cache: 112 KB (DSP), 64 KB (ARM) L2 cache: 96 KB (DSP), 256 KB (ARM) NEON SIMD Coprocessor DMA, Interrupt controllers and Timers	Texas Instruments AM3703 @1 GHz L1 cache: 64 KB L2 cache: 256 KB NEON SIMD Coprocessor DMA, Interrupt controllers and Timers
DSP	TMS320DM-C64+ @800 MHz	-
2D/3D graphics acceleration	PowerVR SGX 530 GPU, providing 2D/3D graphics acceleration with OpenGL ES1.0, OpenGL ES2.0 and Open VG support	-
Video acceleration	Video acceleration: H.264, H.263, MPEG-4, MPEG-2, JPEG, WMV9 and additional codecs. Video encoder/decoder up to 720p.	-
Camera Interface	Camera ISP processing capability to connect RAW image sensor modules	

Table 2 Processor

Feature	IGEP™ COM MODULE DM3730 Specifications	IGEP™ COM MODULE AM3703 Specifications
RAM Memory	512 MBytes LPDDR SDRAM @200 MHz	256 MBytes LPDDR SDRAM @200 MHz
Storage	NAND Flash 512 MBytes On board micro-SD socket	NAND Flash 512 MBytes On board micro-SD socket

Table 3 Memory and Storage

Feature	IGEP™ COM MODULE DM3730/AM3703 Specifications
Debug	Console 1,8 V CMOS into J1 connector
Indicators	2 Bicolor USER LEDs
USB 2.0 LS/FS/HS OTG	1 Mini AB USB connector (dual role)
microSD	micro-SD connector (SD and SDHC cards supported)
Expansion connector	2 x Expansion 70-pin connector: • UART, McBSP, McSPI, ADCs, I2C, GPIOs, GPMC, IRQ and clocks • Analog input / output audio • LCD 24-bit parallel interface • USB 2.0 HS HOST • USB 2.0 LS/FS/HS OTG • Resets • RTC VBAT and 4,2 V input voltage 1 x Camera 27-pin connector 1x Expansion 27-pin connector (optional): • Keyboard matrix, McSPI, MMC, McBSP and S-VIDEO

Table 4 On-board connectors and devices

Feature	IGEP™ COM MODULE DM3730
WI-FI	IEEE 802.11 b/g/n 2,4GHz
Bluetooth	4.0 Class 1
Antenna Wi-Fi/Bluetooth	Shared internal antenna (integrated on PCB) and optional external antenna (HIROSE UL connector)

Table 5 Wireless connectivity

Feature	IGEP™ COM MODULE DM3730/AM3703 Specifications
Power from expansion connector	3,5-4,2 Vcc / 0,5 A (Without USB) – 3,5-4,2 Vcc / 0,7A (With USB) 2 mm socket connector for wall plug or JST Connector
Power from expansion connectors	Supply Voltage: 5 V, 4,2 V and 1,8 V
Power Management	TPS65950

Table 6 Power

Feature	IGEP™ COM MODULE DM3730/AM3703 Specifications
Temperature Range	Commercial (0 to 70 Cº) and Industrial range (-40 to +85 Cº Degrees) are available (**Contact ISEE sales**)
PCB size	18x68,5x1,6 mm

Table 7 Mechanical and environmental

WARNING: IGEP™ COM MODULE DM3730/AM3703 CAN ONLY BE POWERED UP TO +4,2 Vdc POWER SUPPLY, OTHERWISE THE BOARD WILL BE PERMANENT DAMAGED!

3.5 IGEP™ COM MODULE DM3730 BLOCK DIAGRAM

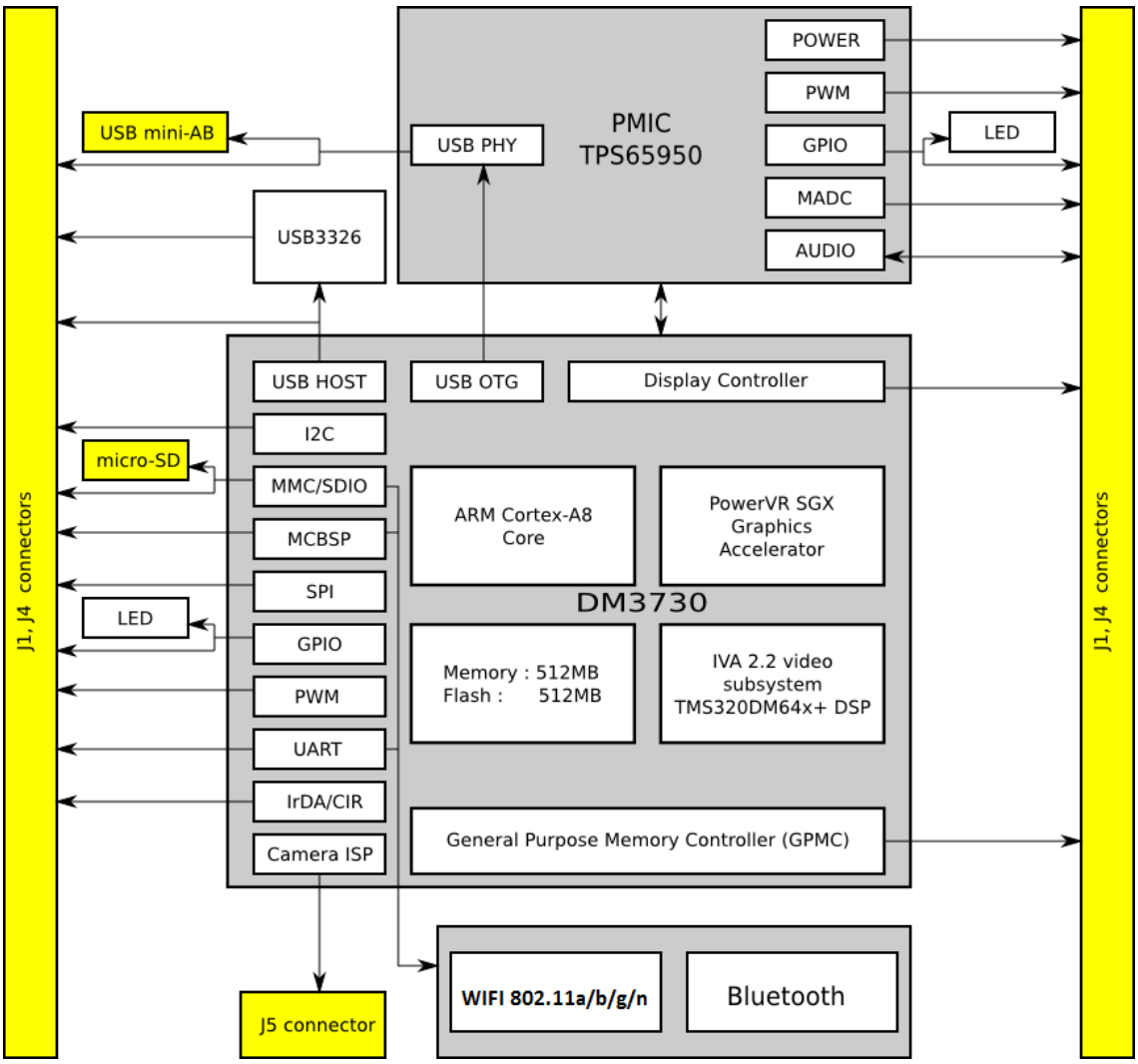

Figure 5 IGEP™ COM MODULE DM3730 RG version Block Diagram

3.6 IGEP™ COM MODULE AM3703 BLOCK DIAGRAM

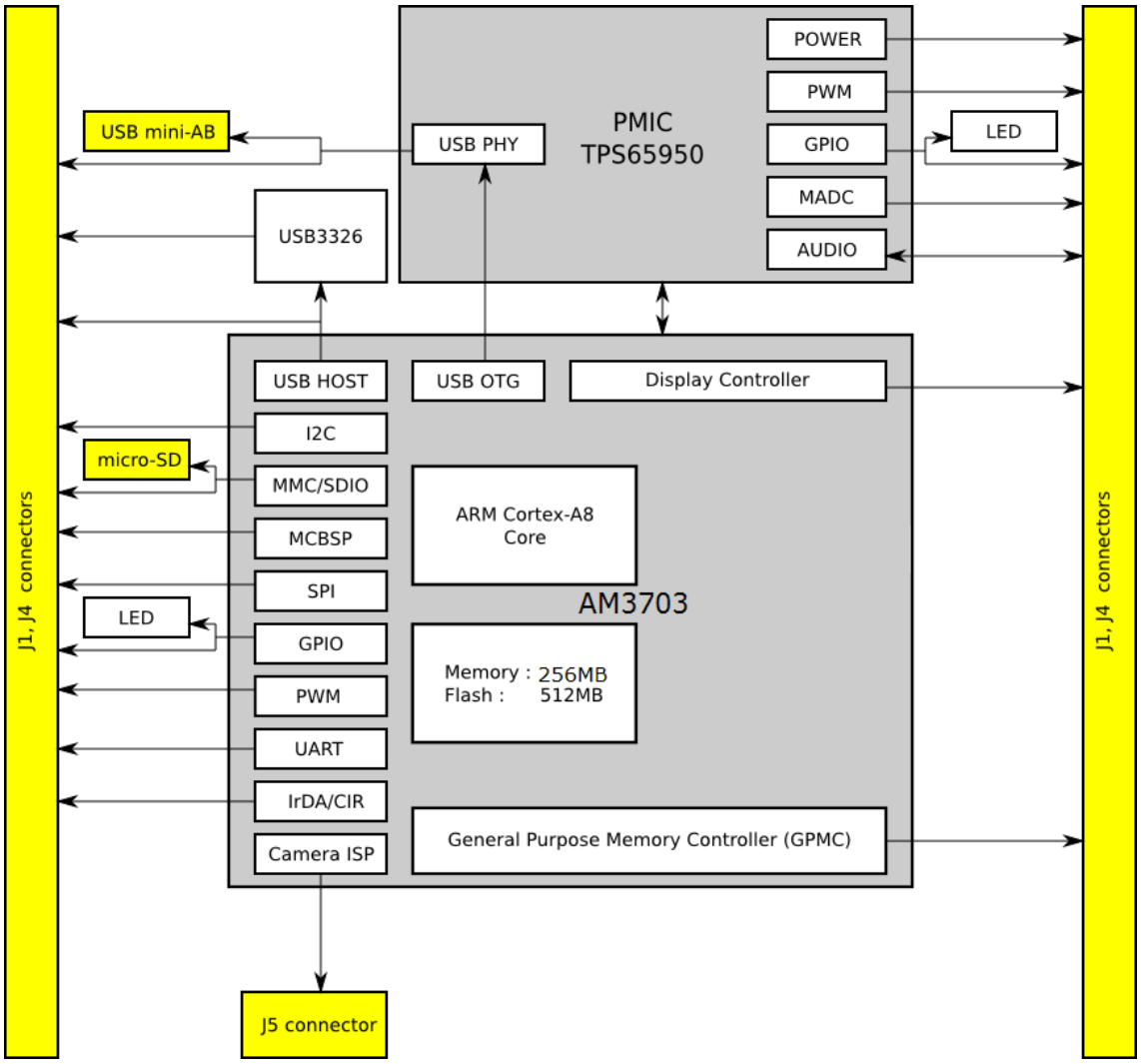

Figure 6 IGEP™ COM MODULE AM3703 RG version Block Diagram

3.7 GENERAL VIEW

Figure 7 IGEP™ COM MODULE DM3730 RG version board top side components

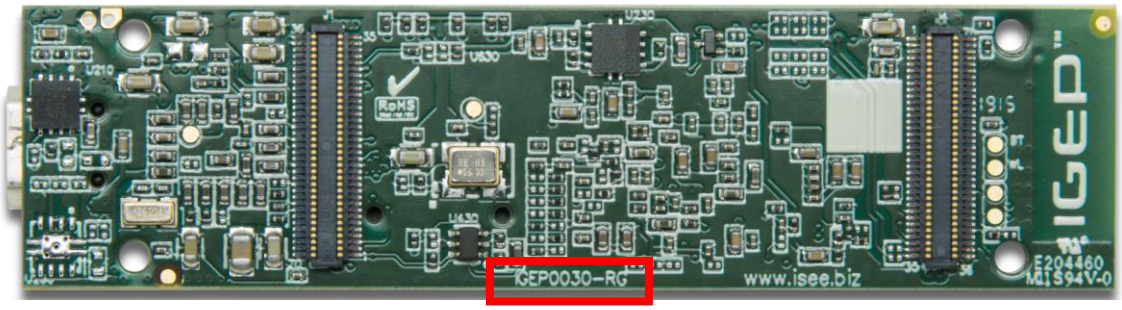

Figure 8 IGEP™ COM MODULE DM3730 RG version board bottom side components

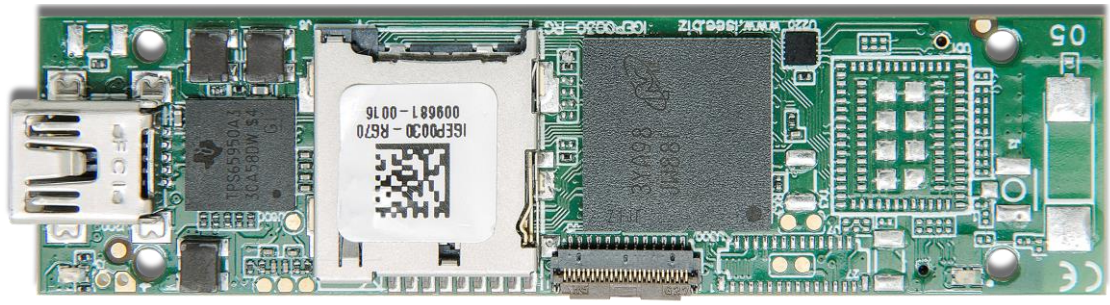

Figure 9 IGEP™ COM MODULE AM3703 RG version board top side components

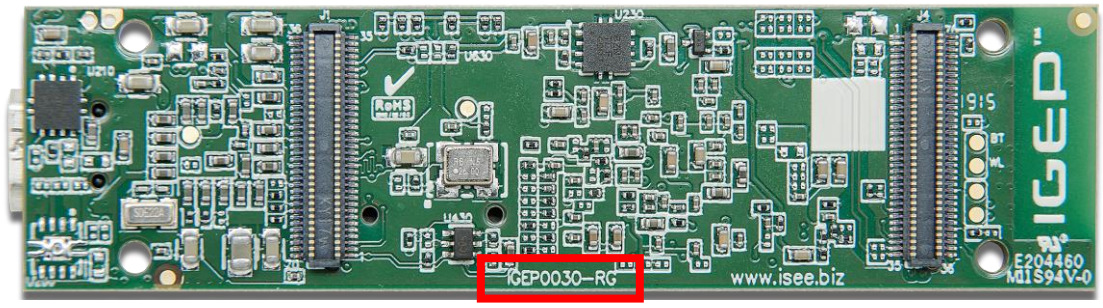

Figure 10 IGEP™ COM MODULE AM3703 RG version board bottom side components

4 ON-BOARD DEVICES & INTERFACES

4.1 SUMMARY

Device	Connector	Ref:	Comments
OMAP PROCESSOR	p/n: DM3730 or AM3703	-	***http://focus.ti.com***
MEMORY	POP TECHNIQUE	-	NAND Flash 512 MB 512 MB or 256 MB LPDDR SDRAM @200 MHz
POWER Management	p/n: TPS65950	-	***http://focus.ti.com***
WIFI 802.11 b/g/n	p/n: WL1831	UD11, J2(*)	**OPTIONAL** EXTERNAL ANTENNA (U.FL coaxial connector) Only available into IGEP COM MODULE DM3730
BLUETOOTH	p/n: WL1831	UD11, J2(*)	**OPTIONAL** EXTERNAL ANTENNA (U.FL coaxial connector) Only available into IGEP COM MODULE DM3730
MAIN POWER	Expansion 70-pin connector	J1, J4	+4,2 Vdc (VBAT)
1,8 V SERIAL DEBUG	Expansion 70-pin connector	J1	UART3
KEYBOARD MATRIX	Expansion 27-pin connector	J7(*)	Keyboard matrix 3x3
TFT INTERFACE	Expansion 70-pin connector	J1	DSS_DATA0:23 and display clocks
S-VIDEO	Expansion 27-pin connector	J7(*)	S-Video output
CAMERA	Expansion 27-pin connector	J5	CAM_D0:D11 + image clocks
RTC BATTERY BACK UP SOURCE	Expansion 70-pin connector	J1	RTC BACKUP BATTERY power signal available
USB 2.0 OTG	USB mini AB socket or Expansion 70-pin connector	J200, J1	HSUSB
USB 2.0 HOST	Expansion 70-pin connector	J4	USB1HS
AUDIO	Expansion 70-pin connector	J1	MIC_SUB, AUXR, AUXL,HSOR, HSOL and MIC_MAIN_M from TPS65950
LED INDICATORS	2x bicolor LED	D210, D440	Bicolor red and green LEDs
EXPANSION CONNECTORs	Expansion 70-pin connectors and expansion 27-pin connectors	J1, J4, J5 and J7	Expand many functionalities from OMAP3 processor, Parallel output display, Parallel input cam, GPMC, AUDIOs, ADCs, POWER, I2Cs, SPIs, McBSPs, USBs, GPIOs, MMC, Keypad, S-VIDEO, Resets, CLKs, IRQs, UARTs, etc.

Table 8 IGEP™ COM MODULE DM3730/AM3703 RG version Interfaces summary

(*) THESE DEVICES and/or CONNECTORS ARE NOT POPULATED BY DEFAULT

4.2 IGEP™ COM MODULE DM3730/AM3703 CONNECTORS MAP

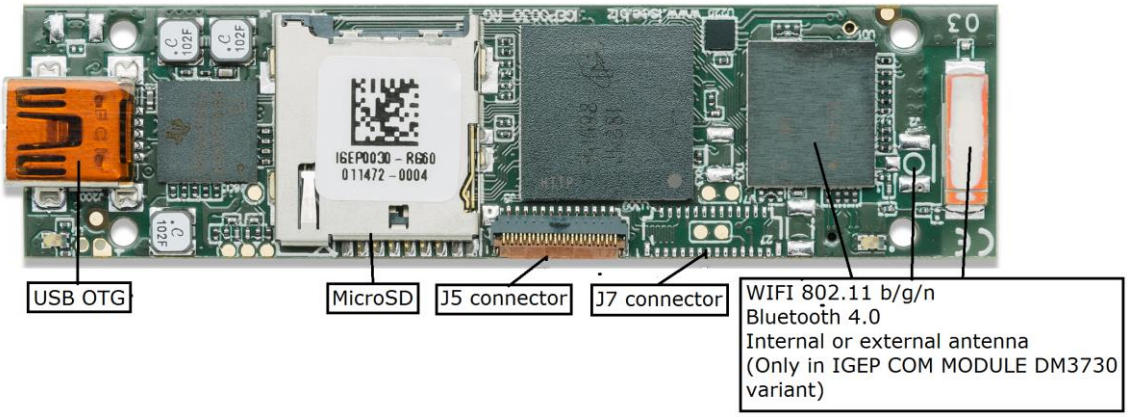

Figure 11 IGEP™ COM MODULE DM3730/AM3703 RG version CONNECTORS MAP TOP

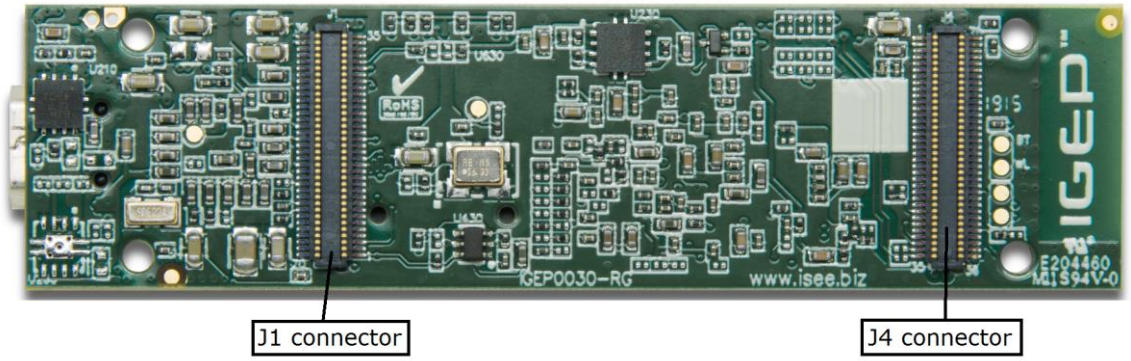

Figure 12 IGEP™ COM MODULE DM3730/AM3703 RG version CONNECTORS MAP BOTTOM

4.3 OMAP PROCESSOR

IGEP™ COM MODULE DM3730/AM3703 COM uses DM3730 or AM3703 as core processor and comes in a 0,4 mm pitch memory POP package on it.

POP (Package on Package) is a technique where the memory, NAND and SDRAM, are mounted on top of the processor. For this reason, when looking at the IGEP™ COM MODULE DM3730/AM3703 COM, you will not find an actual part labeled processor name.

Figure 13 POP Package

For accurate information on this processor, revise OMAP DATA MANUAL official document from Texas Instruments official site ***http://focus.ti.com***

4.4 MEMORY

The memory is mounted on top of the processor as mentioned. The key function of the POP memory is to provide:

- 512 MBytes NAND x16
- 256 MBytes (AM3703 variant) or 512 MBytes (DM3730 variant) LP-DDR SDRAM x32 @ 200 MHz

4.5 POWER MANAGEMENT

The TPS65950 is used to provide power to the IGEP™ COM MODULE DM3730/AM3703 COM. In addition to the power it also provides:

- Stereo Line Audio out
- Stereo Line Audio in
- Stereo Mic in
- Power on reset
- USB OTG PHY
- Status LED

For accurate information on this chip, revise TPS65950 DATA MANUAL official document from Texas Instruments official site ***http://focus.ti.com***

4.6 WIFI/BLUETOOTH INTERFACE

WLAN: Chipset based on TI Wilink8 WL1831. The WL1831 integrates a RF transceiver operating at 2,4 GHz and is IEEE802.11 b/g/n compliant.

Bluetooth: Power class 1 and 4.0 compliant.

4.6.1 BLOCK DIAGRAM

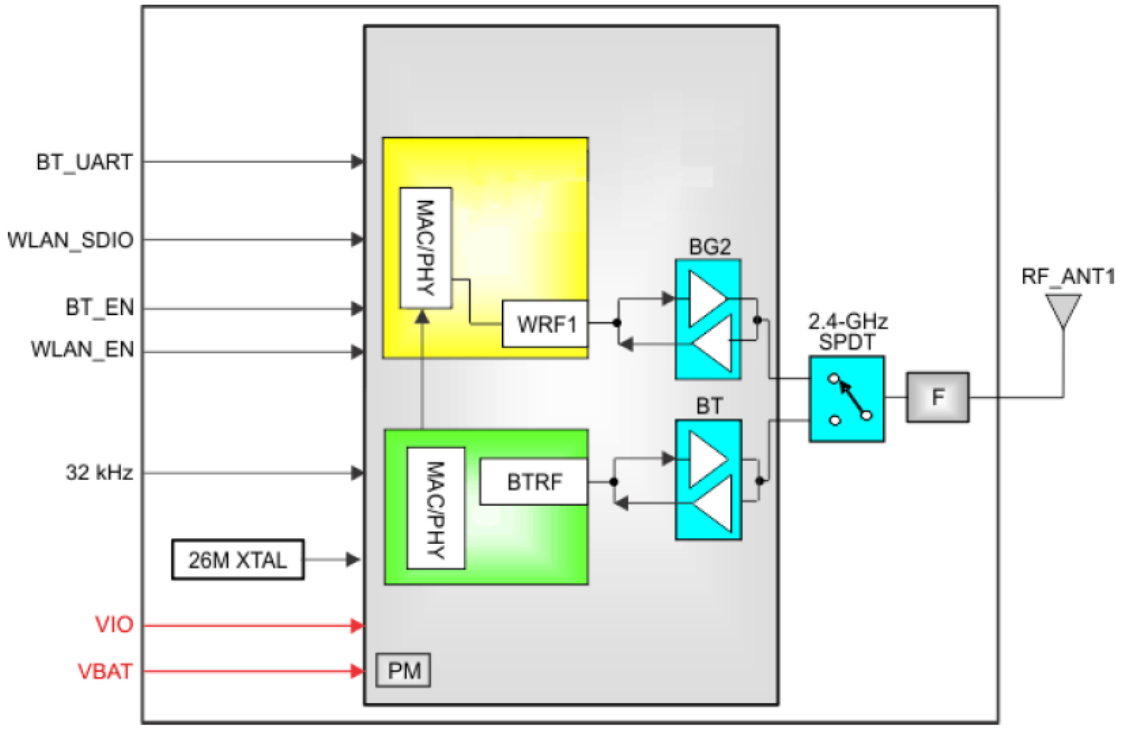

Figure 14 WIFI/Bluetooth Combo module block Diagram

4.6.2 IGEP™ COM MODULES DM3730 ANTENNAS (INTERNAL UD11/EXTERNAL J2)

J2 is U.FL series Hirose connector for the external WIFI/BLUETOOTH antenna (Part number U.FL-R-SMT-1). For the cable you will find cable assemblies if you look for cable assembly RF U.FL to SMA MALE.

PERMANENT DAMAGE CAN BE CAUSED IF ANY VOLTAGE IS APPLIED TO J2 CONNECTORS. ENSURE CORRECT INSERTION ON COAXIAL CONNECTOR IN ORDER TO DO NOT LOSE RF PERFORMANCE

4.7 USB 2.0 OTG: J200 & J1

IGEP™ COM MODULE DM3730/AM3703 COM includes a single USB 2.0 LS/FS/HS OTG Port (J200) mini AB socket directly connected to the USB OTG pins of the OMAP processor.

The USB 2.0 OTG interface is implemented with the DM3730/AM3703 USB 2.0 OTG controller:

- Operates either as the function controller of a high/full speed USB peripheral or as host in point-to-point or multipoint communications
- Complies with the USB 2.0 standard for high-speed (480 Mbps) function and with on-the-go (OTG) supplement.
- Supports USB 2.0 peripheral at High Speed (480 Mbps) and Full Speed (12 Mbps)
- Supports USB 2.0 host at High (480 Mbps), Full (12 Mbps) and Low Speed (1.5 Mbps)

J200 is an USB Type mini AB Socket Connector with Part Number FCI 10033527-N3212MLF or any other compatible.

The USB OTG signals are available through next connector pins:

Signal Name	Pin #	Description
VBUS_5V	J200:1	USB OTG VBUS (+5VDC)
HSUSB_DN	J200:2	USB OTG negative data (D-)
HSUSB_DP	J200:3	USB OTG positive data (D+)
HSUSB_ID	J200:4	USB OTG ID
GND	J200:5	Digital ground

Table 9 USB OTG J200 connector signals

Expansion 70-pin connector has available the same USB OTG signals from J830 connector:

Signal Name	Pin #	Description
VBUS_5V	J1:54	USB OTG VBUS (+5VDC)
HSUSB_DN	J1:37	USB OTG negative data (D-)
HSUSB_DP	J1:36	USB OTG positive data (D+)
HSUSB_ID	J1:46	USB OTG ID
GND	J1:70	Digital ground

Table 10 USB OTG J1 connector signals

IGEP™ COM MODULE DM3730/AM3703 RG version COM cannot be powered standalone using J200 connector. Not use J200 and J1 USB OTG signals at the same time. For additional details, please refer to section 22.1 of the **DM3730 Technical Reference Manual"**

4.8 USB 2.0 HOST: J4

IGEP™ COM MODULE DM3730/AM3703 COM HS HOST Port supports only high speed devices (USB 2.0 HS devices). In order to support low speed devices (USB 1.0 LS devices) or full speed devices (USB 1.1 FS devices), external self-powered USB 2.0 HUB must be used.

The USB HOST signals are available through next connector pins:

Signal Name	Pin #	Description
HOST_D-	J4:35	USB negative data (D-)
HOST_D+	J4:34	USB positive data (D+)
GND	J4:33	Digital ground
GPMC_NCS3 (GPIO_54)	-	USB Host reset

Table 11 USB HOST J4 connector signals

4.9 MICRO-SD: J6

A micro-SD connector is provided for micro-SD cards form factor. The micro-SD connector supports SD and SDHC cards. SDHC (Secure Digital High Capacity, SD 2.0) is an extension of the SD standard which increases card's storage capacity up to 32 GB. SDHC cards shares the same physical and electrical form factor as older (SD 1.x) cards, allowing SDHC-devices to support both newer SDHC cards and older SD-cards.

4.10 LED INDICATORS: D210 & D440

There are two bicolor LED provided with IGEP™ COM MODULE DM3730/AM3703 COM that can be controlled by the user. In total are like 4 individual LED and 16 color schemes

- Two LED are controlled via GPIO pins on the DM3730/AM3703 Processor
- Two LED are controlled via I2C interface on the TPS65950

Figure 15 IGEP™ COM MODULE DM3730/AM3703 RG version D210 & D440 location

Signal Name	LED:COLOR	Description
PMIC: LEDA	D440:RED	Controlled by TPS65950 LEDA
GPIO_168 (I2C2_SCL)	D440:GREEN	Controlled by GPIO_168
GPIO_16 (ETK_D2)	D210:RED	Controlled by GPIO_16
PMIC: LEDB	D210:GREEN	Controlled by TPS65950 LEDB

Table 12 Bicolor LEDs D440 & D210 signals

4.11 CAMERA INTERFACE: J5

There is one 27 pin HIROSE Series FH26 (0.3mm pitch for flex circuit cable) used for Camera interface named J5 connector:

Figure 16 IGEP™ COM MODULE DM3730/AM3703 RG version J5 location

Below pin table show you pin out of IGEP™ COM MODULE DM3730/AM3703 camera connector J5, with functionalities that you can configure. Each table has several columns:

- **Pin #**: (JJ:PP format) where JJ means J5 connector and PP means pin number.
- **TYPE**: What kind of pin and origin silicon chip:

  OMAP: processor; PMIC: power management chip; PWR: Power and ground lines
- **MODE 0, MODE 1, MODE 2, MODE 3, MODE 4, MODE 5, MODE 6, MODE 7**: OMAP3x pin could be configured up to 7 different modes. Complexity of configuration could be solved at "Pin Mux Utility for ARM(R) Microprocessors" on http://www.ti.com/tool/pinmuxtool
- Functions within [] brackets on column "MODE 0" denote board pin function.

For additional details, please refer to **"DM3730 or AM3703 Applications Processor"** (www.TI.com)

Pin #	TYPE	MODE 0	MODE 2	MODE 4	MODE 5	MODE 7
J5:1	OMAP	CAM_HS	-	GPIO_94	hw_dbg0	safe_mode
J5:2	OMAP	CAM_VS	-	GPIO_95	hw_dbg1	safe_mode
J5:3	OMAP	CAM_XCLKA	-	GPIO_96	-	safe_mode
J5:4	OMAP	CAM_PCLK	-	GPIO_97	hw_dbg2	safe_mode
J5:5	OMAP	CAM_FLD	cam_global_reset	GPIO_98	hw_dbg3	safe_mode
J5:6	OMAP	CAM_D0	-	GPIO_99	-	safe_mode
J5:7	OMAP	CAM_D1	-	GPIO_100	-	safe_mode
J5:8	OMAP	CAM_D2	-	GPIO_101	hw_dbg4	safe_mode
J5:9	OMAP	CAM_D3	-	GPIO_102	hw_dbg5	safe_mode
J5:10	OMAP	CAM_D4	-	GPIO_103	hw_dbg6	safe_mode
J5:11	OMAP	CAM_D5	-	GPIO_104	hw_dbg7	safe_mode
J5:12	OMAP	CAM_D6	-	GPIO_105	-	safe_mode
J5:13	OMAP	CAM_D7	-	GPIO_106	-	safe_mode
J5:14	OMAP	CAM_D8	-	GPIO_107	-	safe_mode
J5:15	OMAP	CAM_D9	-	GPIO_108	-	safe_mode
J5:16	OMAP	CAM_D10	-	GPIO_109	hw_dbg8	safe_mode
J5:17	OMAP	CAM_D11	-	GPIO_110	hw_dbg9	safe_mode
J5:18	OMAP	CAM_XCLKB	-	GPIO_111	-	safe_mode
J5:19	OMAP	CAM_WEN	cam_shutter	GPIO_167	hw_dbg10	safe_mode
J5:20	OMAP	CAM_STROBE	-	GPIO_126	hw_dbg11	safe_mode
J5:21	PWR	VIO_1V8	-	-	-	-
J5:22	PMIC	PMIC_SYSEN	-	-	-	-
J5:23	PWR	GND	-	-	-	-
J5:24	PWR	VBAT	-	-	-	-
J5:25	OMAP	GPMC_WAIT1	-	GPIO_63	-	safe_mode
J5:26	OMAP	I2C3_SCL	-	GPIO_184	-	safe_mode
J5:27	OMAP	I2C3_SDA	-	GPIO_185	-	safe_mode

Table 13 Camera connector J5 signals

All signals are 1,8 V. It is suggested that the VBAT voltage rail (3,3 V- 4, 2 V) be used to generate the required voltages for an adapter card.

WARNING: CAMERA signals go directly to OMAP processor. Improper use of this connector could result on permanent damage to this processor.

4.12 EXPANSION INTERFACE II: J7

There is one 27 pin HIROSE Series FH26 (0.3mm pitch for flex circuit cable) used to extend IGEP™ COM MODULE DM3730/AM3703 COM features named J7 connector. This connector is not mounted by default:

Figure 17 IGEP™ COM MODULE DM3730/AM3703 RG version J7 location

Below pin table show you pin out of IGEP™ COM MODULE DM3730/AM3703 expansion connector J7, with functionalities that you can configure. Each table has several columns:

- **Pin #**: (JJ:PP format) where JJ means J5 connector and PP means pin number.
- **TYPE**: What kind of pin and origin silicon chip:

  OMAP: processor; PMIC: power management chip; PWR: Power and ground lines
- **MODE 0, MODE 1, MODE 2, MODE 3, MODE 4, MODE 5, MODE 6, MODE 7**: OMAP3x pin could be configured up to 7 different modes. Complexity of configuration could be solved at "Pin Mux Utility for ARM(R) Microprocessors" on http://www.ti.com/tool/pinmuxtool
- "gray shading" marked function names denote the function is already being used on board and should not be used.
- Functions within [] brackets on column "MODE 0" denote board pin function.

For additional details, please refer to **"DM3730 or AM3703 Applications Processor"** (www.TI.com)

Pin #	TYPE	MODE 0	MODE 1	MODE 2	MODE 4	MODE 7
J7:1	OMAP	McBSP1_CLKR	McSPI4_CLK	-	GPIO_156	safe_mode
J7:2	OMAP	McBSP1_FSR	-	CAM_GLOBAL_RESET	GPIO_157	safe_mode
J7:3	OMAP	McBSP1_DX	McSPI4_SIMO	McBSP3_DX	GPIO_158	safe_mode
J7:4	OMAP	McBSP1_DR	McSPI4_SOMI	McBSP3_DR	GPIO_159	safe_mode
J7:5	OMAP	McBSP1_FSX	McSPI4_CS0	McBSP3_FSX	GPIO_161	safe_mode
J7:6	OMAP	McBSP1_CLKX	-	McBSP3_CLKX	GPIO_162	safe_mode
J7:7	PMIC	GPIO0/CD1	-	-	-	-
J7:8	PWR	VMMC1.OUT	-	-	-	-
J7:9	OMAP	MMC1_CMD	-	-	GPIO_121	safe_mode
J7:10	OMAP	MMC1_CLK	-	-	GPIO_120	safe_mode
J7:11	OMAP	MMC1_D0	-	-	GPIO_122	safe_mode
J7:12	OMAP	MMC1_D1	-	-	GPIO_123	safe_mode
J7:13	OMAP	MMC1_D2	-	-	GPIO_124	safe_mode
J7:14	OMAP	MMC1_D3	-	-	GPIO_125	safe_mode
J7:15	PMIC	KPD.C2	-	-	-	-
J7:16	PMIC	KPD.C1	-	-	-	-
J7:17	PMIC	KPD.C0	-	-	-	-
J7:18	PMIC	KPD.R0	-	-	-	-
J7:19	PMIC	KPD.R1	-	-	-	-
J7:20	PMIC	KPD.R2	-	-	-	-
J7:21	PWR	VIO_1V8	-	-	-	-
J7:22	PMIC	USB_OTG_N	-	-	-	-

J7:23	PMIC	USB_OTG_P	-	-	-	-
J7:24	PMIC	USB_OTG_VBUS	-	-	-	-
J7:25	PWR	GND	-	-	-	-
J7:26	OMAP	TV_OUT2	-	-	-	-
J7:27	OMAP	TV_OUT1	-	-	-	-

Table 14 Expansion connector II J7 signals

All signals are 1,8 V except differential signals (USB and S-VIDEO).

5 EXPANSION CONNECTORS INTERFACES: J1 & J4

The IGEP™ COM MODULE DM3730/AM3703 has 2 connectors of 70-pin (AVX 5602 series) with up to 140 signals at 1,8 V CMOS to support lots of features provided by the OMAP3 processor that can be used in your custom baseboard.

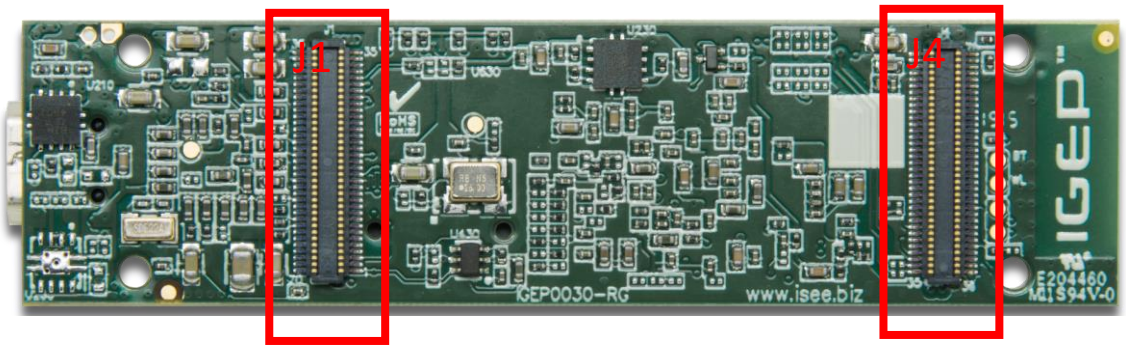

Figure 18 IGEP™ COM MODULE DM3730/AM3703 RG version J1 & J4 location

5.1 PINOUT TABLE OF EXPANSION CONNECTORS

Below pin tables show pin out of expansion connectors (J1 and J4).

Each table has several columns:

- **Pin #**: (JJ:PP format) JJ means J1 or J4 connector and PP means pin number of JJ connector.
- **TYPE**: What kind of pin and origin silicon chip:

  OMAP: processor; PMIC: power management companion chip; PWR: Power and ground lines
- **MODE 0, MODE 1, MODE 2, MODE 3, MODE 4, MODE 5, MODE 6, MODE 7**: OMAP3 pins could be configured up to 7 different ways or modes. Complexity of configuration could be solved at "Pin Mux Utility for ARM(R) Microprocessors" from http://www.ti.com/tool/pinmuxtool

IGEP™ COM MODULE DM3730/AM3703 signals use "MODE 0 name" of OMAP3 to describe pins and lines. For additional details of pins, please refer to section 2.4 and 2.5 of the **"AM3703 / DM3730 Applications Processor".** OMAP3 pins can have up to eight alternate function modes. The following tables provide a description of signal multiplexing.

- "gray shading" marked function names denote the function used in the IGEP™ COM PROTON board and **that functions should not be changed**.

- "~~cross out~~" marked function names you should not use them

Pin #	TYPE	MODE 0	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7
J1:1	PMIC	pmic_sys_nrpwron							
J1:2	OMAP	dss_data1		uart1_rts	dssvenc656_data1	gpio_71			safe_mode
J1:3	OMAP	dss_data0		uart1_cts	dssvenc656_data0	gpio_70			safe_mode
J1:4	OMAP	dss_data3			dssvenc656_data3	gpio_73			safe_mode
J1:5	OMAP	dss_data5		uart3_tx_irtx	dssvenc656_data5	gpio_75			safe_mode
J1:6	OMAP	dss_data2			dssvenc656_data2	gpio_72			safe_mode
J1:7	OMAP	dss_data4		uart3_tx_irrx	dssvenc656_data4	gpio_74			safe_mode
J1:8	OMAP	sys_clkout1				gpio_10			safe_mode
J1:9	OMAP	sys_nirq				gpio_0			safe_mode
J1:10	OMAP	i2c3_sda				gpio_184			safe_mode
J1:11	OMAP	dss_data10				gpio_80			safe_mode
J1:12	OMAP	dss_data11				gpio_81			safe_mode
J1:13	OMAP	i2c3_scl				gpio_185			safe_mode
J1:14	OMAP	sys_clockout2				gpio_186			safe_mode
J1:15	OMAP	dss_data22		mcspi3_cs1	dss_data4	gpio_92			safe_mode
J1:16	OMAP	uart2_rx	mcbsp3_fsx	gpt8_pwm_evt		gpio_147			safe_mode
J1:17	OMAP	dss_data13				gpio_83			safe_mode
J1:18	OMAP	uart2_cts	mcbsp3_dx	gpt9_pwm_evt		gpio_144			safe_mode
J1:19	OMAP	dss_data14				gpio_84			safe_mode
J1:20	OMAP	dss_data15				gpio_85			safe_mode
J1:21	OMAP	uart2_tx	mcbsp3_clkx	gpt11_pwmn_evt		gpio_146			safe_mode
J1:22	OMAP	uart3_cts_rctx				gpio_163			safe_mode
J1:23	OMAP	dss_data21		mcspi3_cs0	dss_data3	gpio_91			safe_mode
J1:24	OMAP	dss_data17				gpio_87			safe_mode
J1:25	OMAP	dss_data18		mcspi3_clk	dss_data0	gpio_88			safe_mode
J1:26	OMAP	uart3_tx_irtx				gpio_166			safe_mode
J1:27	OMAP	dss_data19		mcspi3_simo	dss_data1	gpio_89			safe_mode
J1:28	OMAP	dss_data9				gpio_79	hw_dbg17		safe_mode
J1:29	OMAP	dss_data7		uart1_rx	dssvenc656_data7	gpio_77	hw_dbg15		safe_mode
J1:30	OMAP	dss_data8				gpio_78	hw_dbg16		safe_mode
J1:31	OMAP	uart3_rx_irrx				gpio_165			safe_mode
J1:32	OMAP	dss_pclk				gpio_66	hw_dbg12		safe_mode
J1:33	OMAP	dss_data6		uart1_tx	dssvenc656_data6	gpio_76	hw_dbg14		safe_mode
J1:34	OMAP	dss_vsync				gpio_68			safe_mode
J1:35	OMAP	dss_hsync				gpio_67	hw_dbg13		safe_mode
J1:36	PMIC	pmic_usbotg_dp							
J1:37	PMIC	pmic_usbotg_dn							
J1:38	PMIC	pmic_auxl							
J1:39	PMIC	pmic_mic_sub_m							
J1:40	PMIC	pmic_adcin4							
J1:41	PMIC	pmic_auxr							
J1:42	PMIC	pmic_pwm0							
J1:43	OMAP	dss_acbias				gpio_69			safe_mode
J1:44	OMAP	dss_data16				gpio_86			safe_mode
J1:45	OMAP	dss_data20		mcspi3_somi	dss_data2	gpio_90			safe_mode
J1:46	PMIC	pmic_usbotg_id							
J1:47	OMAP	hdq_sio	sys_altclk	i2c2_sccbe	i2c3_sccbe	gpio170			safe_mode
J1:48	PMIC	pmic_adcin3							
J1:49	PMIC	pmic_pwm1							
J1:50	PWR	GND							
J1:51	PMIC	pmic_adcin5							
J1:52	PMIC	pmic_vbackup							
J1:53	PMIC	pmic_adcin6							
J1:54	PMIC	pmic_usbotg_vbus							
J1:55	OMAP	uart2_rts	mcbsp3_dr	gpt10_pwm_evt		gpio_145			safe_mode
J1:56	PWR	GND							
J1:57	PMIC	pmic_mic_main_m							
J1:58	PMIC	pmic_adcin2							
J1:59	PMIC	pmic_regen							
J1:60	OMAP	dss_data12				gpio_82			safe_mode
J1:61	OMAP	dss_data23			dss_data5	gpio_93			safe_mode
J1:62	OMAP	etk_d1	mcspi3_somi		hsub1_data1	gpio_15	mm1_txse0	hsusb1_tll_data1	hw_dbg3
J1:63	OMAP	uart3_rts_sd				gpio_164			safe_mode
J1:64	PMIC	pmic_adcin7							
J1:65	PMIC	pmic_pwron							
J1:66	PWR	VBAT							
J1:67	PWR	VBAT							
J1:68	PMIC	pmic_hsor							
J1:69	PMIC	pmic_hsol							
J1:70	PWR	GND							

Table 15 Expansion connector J1 signals

NOTE: Pin 39 and Pin 57 of J1 (MIC inputs) have DC BIAS Voltage since IGEP0030-RGxx and following revisions

Pin #	TYPE	MODE 0	MODE 1	MODE 2	MODE 3	MODE 4	MODE 5	MODE 6	MODE 7
J4:1	PWR	VBAT							
J4:2	PWR	VBAT							
J4:3	PWR	GND							
J4:4	OMAP	gpmc_ncs5	~~sys_ndmareq2~~	~~mcbsp4_dr~~	~~gpt10_pwm_evt~~	~~gpio_56~~			~~safe_mode~~
J4:5	OMAP	gpmc_ncs4	sys_ndmareq1	mcbsp4_clkx	gpt9_pwm_evt	gpio_55			safe_mode
J4:6	OMAP	gpmc_nwe							
J4:7	OMAP	gpmc_nadv_ale							
J4:8	OMAP	gpmc_noe							
J4:9	OMAP	~~gpmc_wait3~~	sys_ndmareq1			gpio_65			~~safe_mode~~
J4:10	OMAP	~~gpmc_wait2~~				gpio_64			~~safe_mode~~
J4:11	OMAP	gpmc_a2				~~gpio_35~~			~~safe_mode~~
J4:12	OMAP	gpmc_a8				~~gpio_41~~			~~safe_mode~~
J4:13	OMAP	gpmc_a5				~~gpio_38~~			~~safe_mode~~
J4:14	OMAP	gpmc_a7				~~gpio_40~~			~~safe_mode~~
J4:15	OMAP	gpmc_d2							
J4:16	OMAP	gpmc_d10				~~gpio_46~~			~~safe_mode~~
J4:17	OMAP	gpmc_d3							
J4:18	OMAP	gpmc_d11				~~gpio_47~~			~~safe_mode~~
J4:19	OMAP	gpmc_d4							
J4:20	OMAP	gpmc_d12				~~gpio_48~~			~~safe_mode~~
J4:21	OMAP	gpmc_d5							
J4:22	OMAP	gpmc_d15				~~gpio_51~~			~~safe_mode~~
J4:23	OMAP	etk_ctl		mmc3_cmd	hsusb1_clk	gpio_13		hsusb1_tll_clk	hw_dbg1
J4:24	OMAP	uart1_tx				gpio_148			safe_mode
J4:25	OMAP	mcspi1_cs2			mmc3_clk	gpio_176			safe_mode
J4:26	OMAP	etk_d4	mcbsp5_dr	mmc3_dat0	hsusb1_data4	gpio_18		hsusb1_tll_data4	safe_mode
J4:27	OMAP	mcspi1_cs0	mmc2_dat7			gpio_174			safe_mode
J4:28	OMAP	~~gpmc_ncs2~~				gpio_53			~~safe_mode~~
J4:29	OMAP	etk_d0	mcspi3_simo	mmc3_dat4	hsusb1_data0	gpio_14	mm1_rxrcv	hsusb1_tll_data0	hw_dbg2
J4:30	OMAP	etk_d7	mcspi3_cs1	mmc3_dat7	hsusb1_data3	gpio_21	mm1_txen_n	hsusb1_tll_data3	hw_dbg9
J4:31	OMAP	etk_d3	mcspi3_clk	mmc3_dat3	hsusb1_data7	gpio_17		hsusb1_tll_data7	hw_dbg5
J4:32	OMAP	husb_vbus							
J4:33	PWR	GND							
J4:34	PMIC	pmic_husb_dp							
J4:35	PMIC	pmic_husb_dm							
J4:36	OMAP	etk_d5	mcbsp5_fsx	mmc3_dat1	hsusb1_data5	gpio_19		hsusb1_tll_data5	hw_dbg7
J4:37	OMAP	etk_d8	sys_drm_msecure	mmc3_dat6	hsusb1_dir	gpio_22		hsusb1_tll_dir	hw_dbg10
J4:38	OMAP	etk_d9	sys_secure_indicator	mmc3_dat5	hsusb1_nxt	gpio_23	mm1_rxdm	hsusb1_tll_nxt	hw_dbg11
J4:39	OMAP	etk_d6	mcbsp5_fsx	mmc3_data2	hsusb1_data6	gpio_20		hsusb1_tll_data6	hw_dbg8
J4:40	OMAP	etk_clk	mcbsp5_clkx	mmc3_clk	hsusb1_stp	gpio_12	mm1_rxdp	hsusb1_tll_stp	hw_dbg0
J4:41	OMAP	csi2_dx1				gpio_114			safe_mode
J4:42	OMAP	mcspi1_cs1			mmc3_cmd	gpio_175			safe_mode
J4:43	OMAP	mcspi1_clk	mmc2_dat4			gpio_171			safe_mode
J4:44	OMAP	mcspi1_simo	mmc2_dat5			gpio_172			safe_mode
J4:45	OMAP	mcspi1_somi	mmc2_dat6			gpio_173			safe_mode
J4:46	OMAP	uart1_rts				gpio_149			safe_mode
J4:47	OMAP	uart1_cts				gpio_150	hsusb3_tll_clk		safe_mode
J4:48	OMAP	uart1_rx		mcbsp1_clkr	mcspi4_clk	gpio_151			safe_mode
J4:49	OMAP	gpmc_d7							
J4:50	OMAP	gpmc_d14				~~gpio_50~~			~~safe_mode~~
J4:51	OMAP	gpmc_d6							
J4:52	OMAP	gpmc_d13				~~gpio_49~~			~~safe_mode~~
J4:53	OMAP	gpmc_d1							
J4:54	OMAP	gpmc_d8				~~gpio_44~~			~~safe_mode~~
J4:55	OMAP	gpmc_d9				~~gpio_45~~			~~safe_mode~~
J4:56	OMAP	gpmc_d0							
J4:57	OMAP	gpmc_a6				~~gpio_39~~			~~safe_mode~~
J4:58	OMAP	gpmc_a1				~~gpio_34~~			~~safe_mode~~
J4:59	OMAP	gpmc_a3				~~gpio_36~~			~~safe_mode~~
J4:60	OMAP	gpmc_a10	sys_ndmareq3			~~gpio_43~~			~~safe_mode~~
J4:61	OMAP	gpmc_a4				~~gpio_37~~			~~safe_mode~~
J4:62	OMAP	gpmc_a9	sys_ndmareq2			~~gpio_42~~			~~safe_mode~~
J4:63	OMAP	gpmc_nwp							
J4:64	OMAP	gpmc_ncs1				gpio_52			safe_mode
J4:65	OMAP	gpmc_nbe0_cle				gpio_60			safe_mode
J4:66	OMAP	gpmc_ncs0							
J4:67	OMAP	gpmc_ncs6	sys_ndmareq3	mcbsp4_dx	gpt11_pwm_evt	gpio_57			safe_mode
J4:68	OMAP	gpmc_wait0							
J4:69	OMAP	gpmc_nbe1				gpio_61			safe_mode
J4:70	OMAP	gpmc_clk				~~gpio_59~~			~~safe_mode~~

Table 16 Expansion connector J4 signals

6 DEVELOPING A BASE BOARD

This section describes two base board circuit examples in order to help you start to develop your own compatible hardware expansion for IGEP™ COM MODULE DM3730/AM3703.

6.1 IGEP™ NEW YORK BASEBOARD

You have a simple option to start your specific development by buying our already in the market IGEP™ NEW YORK Baseboard. With this board you will be able to power the IGEP™ COM MODULE DM3730/AM3703 with an external 5V DC power supply and access to several J1 and J4 pins with a more affordable 2,54mm (1") pitch format. Please check in our www.iseebcn.com website at product webpage for detailed information about its possibilities, public schematics and hardware user manual.

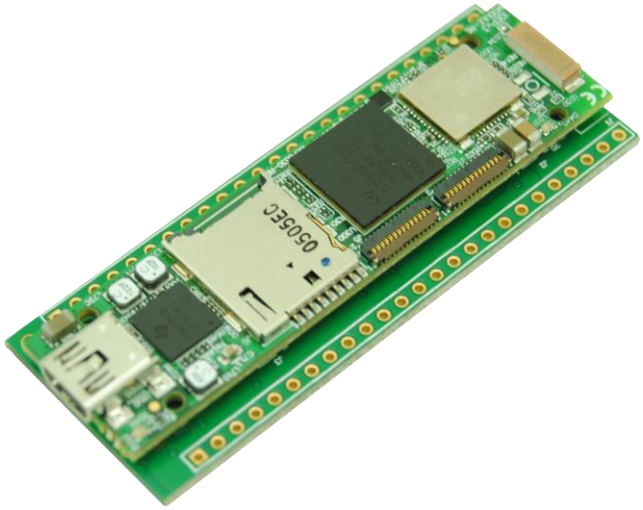

Figure 19 IGEP™ NEW YORK TOP view plus IGEP™ COM MODULE

6.2 IGEP™ BERLIN BASEBOARD

You have a complete option to start your specific development by buying our already in the market IGEP™ BERLIN baseboards. This board contains a large number of devices and that will show how they could connect to the IGEP™ COM MODULE DM3730/AM3703. Please check in our www.iseebcn.com website at product webpage for detailed information about its possibilities, public schematics and hardware user manual.

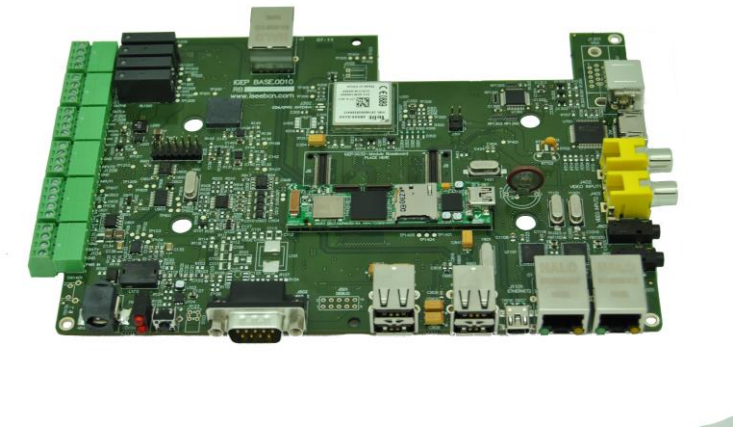

Figure 20 IGEP™ BERLIN TOP view plus IGEP™ COM MODULE

7 MECHANICAL SPECIFICATIONS

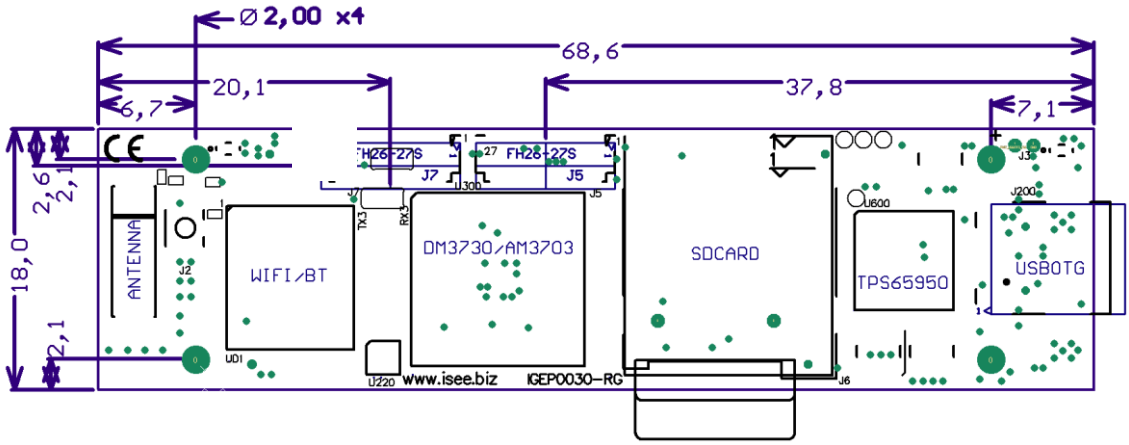

Figure 21 IGEP™ COM MODULE DM3730/AM3703 RG version Mechanical View TOP

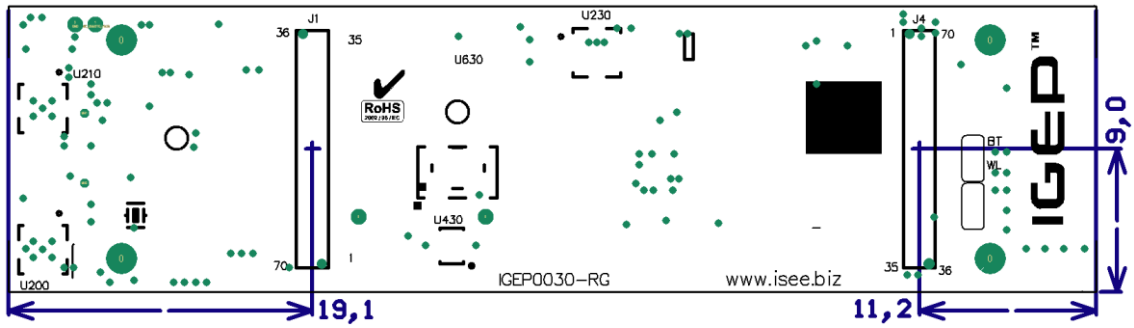

Figure 22 IGEP™ COM MODULE DM3730/AM3703 RG version Mechanical View BOT

1. All dimensions are in millimeters.
2. Board size 18x68.5 mm
3. 2 x 70-pin AVX 5602-14 with 0.4mm pitch connectors
4. 4 mounting holes, one in each corner (2mm diameter)

8 ELECTRICAL CHARACTERISTICS

Electrical parameter	Min	Typ	Max	Unit
POWER VBAT (1)				
Input Voltage DC	3.5	3.8	4.2	V
Current DC(1)	80	350	700	mA
POWER VIO_1V8				
Output Voltage DC	1.7	1.8	1.9	V
Current DC			50	mA
POWER vmmc1.out				
1.8-V mode Output Voltage DC	1.7	1.8	1.9	V
3.0-V mode Output Voltage DC	2.7	3.0	3.3	V
Current DC vmmc1.out (when SD not used)			220	mA
OMAP TYPE pins (2)				
Input/output High-Level DC voltage	1.2	1.8	2.1	V
Input/output Low-Level DC voltage	-0.3	0	0.65	V
PMIC TYPE pins (3)				
Input/output High-Level DC voltage	1.2	1.8	2.1	V
Input/output Low-Level DC voltage	-0.3	0	0.65	V
USB 2.0 OTG				
High Speed Mode (HS)			480	Mb/s
Full Speed Mode (FS)			12.5	Mb/s
Low Speed Mode (LS)			1.5	Mb/s
USB 2.0 Host				
High Speed Mode (HS)			480	Mb/s
microSD				
1.8-V mode	1.7	1.8	1.9	V
3.0-V mode	2.7	3.0	3.3	V
Current			220	mA
Clock			48	MHz
Audio-In (AUX)				
Peak-to-peak single-ended input voltage (0 dBFs)			1.5	Vpp
Total harmonic distortion (sine wave @ 1.02 kHz @ -1 dBFs)		-80	-75	dB
Total harmonic distortion (sine wave @ 1.02 kHz) 20 Hz to 20 kHz, A-weighted audio, Gain = 0 dB		-85	-78	dB
Mic-In (Sub, Main_m)				
Bias Voltage	2,15	2,2	2,25	V
Electret mic capacitance			200	pF
Audio-Out (HSO)				
Load Impedance @100 pF	14	16		Ohms
Maximum Output Power (At 0.53 Vrms differential output voltage and load impedance = 16 Ohms)		17.56		mW
Peak-to-Peak output voltage			1.5	Vpp
Total Harmonic Distortion @ 0 dBFs		-80	-75	dB
Idle channel noise (20Hz to 20KHz)		-90	-85	dB
Wifi IEEE802.11b				
Specification		IEEE802.11b		
Frequency 2400 - 2500MHz	2412		2472	MHz
Data rate		1, 2, 5.5, 11		Mbps
Power Levels	10,5	15,0		dBm
Minimum Input Level Sensitivity 11Mbps (FER < 8%)		-87	-81	dBm
Maximum Input Level	-10			dBm
Wifi IEEE802.11g				
Specification		IEEE802.11g		
Frequency 2400 - 2500MHz	2412		2472	MHz
Data rate		6, 9, 12, 18, 24, 36, 48, 54		Mbps
Power Levels	7,5	11,5		dBm
Minimum Input Level Sensitivity 54Mbps (PER < 10%)		-73	-68	dBm

Maximum Input Level	-20			dBm
Wifi IEEE802.11n				
Specification		IEEE802.11n		
Frequency 2400 - 2500MHz	2412		2472	MHz
Data rate		15, 30, 45, 60, 90, 120, 135, 150		Mbps
Power Levels	6,0	10,5		dBm
Minimum Input Level Sensitivity MCS7 (PER < 10%)		-71	-66	dBm
Maximum Input Level	-20			dBm
Bluetooth 4.0				
Bluetooth specification		4.0 Power Class 1		
Channel spacing		1		MHz
Output Power	8,5	11,5		dBm
Frequency range (Rx/Tx)	2400		2483.5	MHz
Sensitivity (BER ≦ 0.1%)				
1) 2402MHz	-85			dBm
2) 2441MHz	-85			dBm
3) 2480MHz	-85			dBm
C/I Performance (BER ≦ 0.1%)				
1) co-channel ratio (-60dBm input)			11	dBm
2) 1MHz ratio (-60dBm input)			0	dBm
3) 2MHz ratio (-60dBm input)			-30	dBm

(1) Current measured with default delivered software. Be aware that different software configurations could drastically modify current consumption. For more information see: http://labs.isee.biz/index.php/IGEP_Devices_Power_Consumption_Measurements

(2) The electrical specification depends on the configured mode. For accurate information of each pin, revise OMAP3530/25 Applications Processor official document from Texas Instruments official site http://focus.ti.com.

(3) For accurate information of each pin, revise TPS65950 DATA MANUAL official document from Texas Instruments official site http://focus.ti.com.

Table 17 Electrical Characteristics

9 LIST OF TABLES

10 LIST OF FIGURES

11 KNOWN ISSUES

12 TROUBLESHOOTING

13 CHANGE HISTORY

Revision	Date	Description
1.0	2011/10/28	• Initial version
2.0	2013/02/06	• http://bug.isee.biz/roadmap_page.php?version_id=28 • 0000062: **[bug]** Obsolete Ordering Information • 0000075: **[bug]** Wrong pitch for KYOCERA connector for 'on-board interfaces -> summary' • 0000038: **[bug]** Incorrect mmc3 data1 pin in mux description table on J4:39 • 0000054: **[bug]** J4:27 incorrect pin name • 0000053: **[bug]** J4:27 and J4:42 is the same gpio_175 pin • 0000061: **[bug]** Incoherent pin name J4:25 in page 22/23 • 0000058: **[bug]** Incorrect pin name J1:62 and J1:63.
2.1	2013/05/22	• 0000100: **[bug]** Bad photo of IGEP COM NEUTRON (NO wifi) at Figure 2.
3.0	2016/06/07	• Manual of new hardware version: IGEP0030-RGxx

Please check for a newer revision of this manual at ISEE 2007 SL web site

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