



iWave Systems Technologies Pvt. Ltd.

REL 1.7 Page 1 of 18

Document Number	iW-RH01-DS-R1.0-REL1.8		
Release	Date	Description	
REL1.0	25 <sup>th</sup> Feb 2020	Draft Release	
REL1.1	16 <sup>th</sup> Mar 2020	Updated Technical spec, Block diagram, Mechanical dimension section, Expansion connector pin out details	
REL1.2	31 <sup>st</sup> Mar 2020	Added Ordering Information details, Changes in Table format	
REL1.3	02 <sup>nd</sup> April 2020	Added Software specification, Pre-Compliance test details	
REL1.4	13 <sup>th</sup> April 2020	Added Test Specification	
REL1.5	18 <sup>th</sup> April 2020	Updated formatting	
REL1.6	21 <sup>st</sup> April 2020	Updated document heading, added standard clauses, spelling correction, Added Android Software details.	
REL1.7	22 <sup>nd</sup> June 2020	Updated Section 2.4.5 pin description of expansion connector	
REL1.8	22nd Dec 2020Updated Section 2.2: HMI Dimensions as per new Heat si and Back cover Figure 3 HMI Connector updated in Section 2.4 & update ordering information 2.7		
PROPRIETARY NOTICE: This document contains proprietary material for the cale use of the intended			

#### **Revision History**

PROPRIETARY NOTICE: This document contains proprietary material for the sole use of the intended recipient(s). Do not read this document if you are not the intended recipient. Any review, use, distribution or disclosure by others is strictly prohibited. If you are not the intended recipient (or authorized to receive for the recipient), you are hereby notified that any disclosure, copying distribution or use of any of the information contained within this document is STRICTLY PROHIBITED. Thank you. "iWave Systems Tech. Pvt. Ltd."

#### Disclaimer

iWave Systems reserves the right to change details in this publication including but not limited to any Product specification without notice.

No warranty of accuracy is given concerning the contents of the information contained in this publication. To the extent permitted by law no liability (including liability to any person by reason of negligence) will be accepted by iWave Systems, its subsidiaries or employees for any direct or indirect loss or damage caused by omissions from or inaccuracies in this document.

CPU and other major components used in this product may have several silicon errata associated with it. Under no circumstances, iWave Systems shall be liable for the silicon errata and associated issues.

#### Trademarks

All registered trademarks and product names mentioned in this publication are used for identification purposes only.

#### Certification

iWave Systems Technologies Pvt. Ltd. is an ISO 9001:2015 Certified Company.

#### Warranty & RMA

Warranty support for Hardware: 1 Year from iWave or iWave's EMS partner. For warranty terms, go through the below web link, <u>http://www.iwavesystems.com/support/warranty.html</u> For Return Merchandise Authorization (RMA), go through the below web link, <u>http://www.iwavesystems.com/support/rma.html</u>

#### **Technical Support**

iWave Systems technical support team is committed to provide the best possible support for our customers so that our Hardware and Software can be easily migrated and used.

For assistance, contact our Technical Support team at,

Email	: <u>support.hmi@iwavesystems.com</u>
Website	: www.iwavesystems.com
Address	: iWave Systems Technologies Pvt. Ltd.
	# 7/B, 29 <sup>th</sup> Main, BTM Layout 2 <sup>nd</sup> Stage,
	Bangalore, Karnataka,
	India – 560076



### Contents

Сс	onten	ts		4
1	In	trodu	ction	5
	1.1	Purp	ose	5
	1.2	Over	view	5
2	Te	echnica	al Details	6
	2.1	Block	< Diagram	6
	2.2	HMI	Dimension	7
	2.3	HMI	Specification	8
	2.4	HMI	Connectors	10
	2.	4.1	Power Input Connector	11
	2.	4.2	RS485 Connector	11
	2.	4.3	RS232&CAN Connector	12
	2.	4.4	USB Host, USB OTG, Ethernet, Micro SD& 3.5mm Audio Jack	12
	2.	4.5	Expansion Connector	13
	2.5	Softv	vare Specification	15
	2.	5.1	BSP Contents and Features	15
	2.6	Pre-C	Compliance Test Specification	17
	2.7	Orde	ring Information	18

# List of figures

Figure 1 Block Diagram	6
Figure 2 HMI Drawing	7
Figure 3 HMI Connector	10

### 1 Introduction

#### 1.1 Purpose

The document is datasheet of RainboW series HMI solution based on i.mx6 application processor. This solution is fully supported by iWave Systems Technologies Pvt Ltd. This datasheet provides information on overall hardware specification, software specification, mechanical dimension and subjected pre-compliance test cases.

#### 1.2 Overview

HMI is based on iWave Systems Technologies Pvt Ltd i.MX6 SODIMM SOM. The HMI support i.MX6 Quad/Duallite/Solo ARM<sup>™</sup> Cortex-A9 based CPU @ up to 1GHz/Core.

HMI support 7", 10.1" and 12.1" display solution with CTP user interface.

HMI BSP provided will be a collection of Tools, Binary, Source code and support files, these deliverables can be used to create a Linux Kernel Image and Android/Linux Root file system for our HMI solution.

### 2 Technical Details

This section provides technical details of hardware, software and mechanical aspect of HMI.

#### 2.1 Block Diagram



Figure 1 Block Diagram

#### 2.2 HMI Dimension



Note:

All dimensions are in mm. Enclosure design features can change without any notice for improving product feature.

Figure 2 HMI Drawing





### 2.3 HMI Specification

CPU	iMX6 Solo	iMX6 Dual-Lite	iMX6 Quad		
Core Class & CPU Clock	Arm Cortex A9 @1GHz/800MHz				
	Mer	nory			
Flash Memory		4GB eMMC Flash			
RAM	512MB DDR3	1GB	DDR3		
SD card slot		4-bit MMC/SDIO/SD/SDH0	2		
	Operatin	g System			
Supported OS		Linux 4.1.15 & Android 7.1.	1		
GUI		QT			
	Communicat	ion Interfaces			
Ethernet	1x 10	0/100/1000 Mbps Ethernet	(RJ45)		
USB 2.0		2x USB Host (Type A)			
USB OTG		1x USB OTG			
CAN	2x 1Mbps CAN				
RS485	2x RS485				
RS232	1x RS232				
Expansion Connector	16x GPIOs (3.3V CMOS I/O), 1x USB Host, PWM, I2C, SPI, PCIe, Power pins 12V, 5V, 3.3V				
	Wireless Commu	nication interfaces			
WIFI	IEEE 802.11 b/g/n				
Bluetooth	Bluetooth 4.0				
	Au	dio			
Audio		Line Out			
	Encle	osure			
Front Bezel		ABS Plastic			
Back cover	Shee	et metal with Aluminum hea	at sink		
Ingress Protection	Front IP65*/Back IP20				
	Power Supply				
Supply Voltage	12V/24V DC external Supply				
	Typical Environ	ment condition			
Storage Temperature		-20°C to +70°C			
Operating Temperature	-10°C to 60°C				
Humidity	95% @ 40°C				

Table 1 HMI Specification

\*In Plan

LCD Specification				
Size	7"	10.1"	12.1"	
Resolution	800 x 480	1280 x 800	1280 x 800	
Aspect Ratio	16:10	16:10	16:10	
Brightness	850 cd/m <sup>2</sup>	800 cd/m <sup>2</sup>	500 cd/m <sup>2</sup>	
Backlite Life	Min 50K Hrs Min 50K Hrs Min 50K Hrs		Min 50K Hrs	
Touch	Projected Capacitive Multi touch (min 5 point).			
Surface Treatment	Anti-Glare (AG) AG, 7H Glass AG, 3H Glass			

Table 2 LCD and Touch Panel Specification

#### 2.4 HMI Connectors

This section describes the Connectors of HMI



#### Figure 3 HMI Connector

Position	Description
1	Power ON/OFF Switch.
2	Power Input Connector.
3	Ethernet.
4	USB OTG.
5	USB Host.
6	USB Host.
7	2xRS485 Connector.
8	RS232 & CAN Connector (1x RS232 &2x CAN).
9	Audio.

#### 2.4.1 Power Input Connector

Connector part No: 43045-0200 Mating connector part No: 43025-0200 Supporting crimp part No: 43030-0001



#### Table 3 Power Connector Pin Detail

Pin No	Signal Name	Signal Type	Signal Description
1	GND	Power	Ground
2	VCC	Power	12-24V DC Supply.

#### 2.4.2 RS485 Connector

Connector Part No: 43045-1000 Mating connector part No: 43025-1000 Supporting Crimp part No: 43030-0004



Pin No	Signal Name	Signal Type	Signal Description
1	RS485_Y1	Differential	Positive Differential Output of Transceiver 1.
2	RS485_Z1	Differential	Negative Differential Output of Transceiver 1.
3	GND	Power	Ground
4	RS485_Z2	Differential	Positive Differential Output of Transceiver 2.
5	RS485_Y2	Differential	Negative Differential Output of Transceiver 2.
6	RS485_B1	Differential	Positive Differential Input of Transceiver 1.
7	RS485_A1	Differential	Negative Differential Input of Transceiver 1.
8	GND	Power	Ground
9	RS485_A2	Differential	Positive Differential Input of Transceiver 2.
10	RS485_B2	Differential	Negative Differential Input of Transceiver 2.

#### Table 4 RS485 Connector Pin Detail

#### Note:

- By default, both RS485 interfaces will be configured as Full-Duplex.
- RS485\_1 can be configured as Half-duplex also. To configure RS485\_1 as half duplex, externally connect pin no.1 to 7 and pin no. 2 to 6

#### 2.4.3 RS232&CAN Connector

Connector Part No: 43045-1000 Mating connector part No: 43025-1000 Supporting Crimp part No: 43030-0004



Pin No	Signal Name	Signal Type	Signal Description
1	CAN1_L	Differential	Differential Low signal of Transceiver 1.
2	CAN2_L	Differential	Differential Low signal of Transceiver 2.
3	GND	Power	Ground
4	NC	-	No connection.
5	RS232_RX1	Input	3.3V Level Receive signal.
6	CAN1_H	Differential	Differential High signal of Transceiver 1.
7	CAN2_H	Differential	Differential High signal of Transceiver 2.
8	GND	Power	Ground
9	NC	-	No connection.
10	RS232_TX1	Output	3.3V Level Transmit signal.

#### Table 5 RS232 & CAN Connector Pin Details

#### 2.4.4 USB Host, USB OTG, Ethernet, Micro SD& 3.5mm Audio Jack

In this section, the standard connector's part numbers are mentioned. All connector pin outs are as per universal standard.

Interface	Connector Description	Connector Part No
USB OTG	Micro USB Type AB Connector	47589-000
USB 2.0 Host	USB Type A right angle connector	73725-0110BLF
Ethernet	RJ45 Magjack Connector	L829-1J1T-43
Micro SD	Push-Push type 10pin Connector	DM3AT-SF-PEJ
Audio Out	3.5 mm Jack	SJ-43515TS-SMT

#### 2.4.5 Expansion Connector

Connector Part No: FX18-60P-0.8SV Mating connector part No: FX18-60S-0.8SH / FX18-60S-0.8SVxx



Table 6 Expansion Connector Pin out

Pin No	Signal Name	Signal Type	Signal Description
1	GND	Power	Ground
2	PCIE TXM	Differential	PCIe differential transmit line negative.
3	PCIE TXP	Differential	PCIe differential transmit line positive.
4	GND	Power	Ground
5	NC (optional USB OTG)	-	By Default, NC. USB OTG data negative line is optionally connected.
6	NC (optional USB OTG)	-	By Default, NC. USB OTG data positive line is optionally connected.
7	GND	Power	Ground
8	PCIE WAKE	Output	PCIe Wake Signal.
9	PCI Write Disable	Output	PCIe Write Disable Signal.
10	Reset	Input	Assigned for System Reset.
11	GND	Power	Ground
12	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
13	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
14	PWM OUT	Output	Pulse Width Modulation Signal.
15	I2C CLOCK	Bidirectional	I2C Clock Line.
16	I2C DATA	Bidirectional	I2C Data Line.
17	GND	Power	Ground
18	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
19	SPI CLK	Output	SPI Clock.
20	SPI CS1	Output	SPI Chip Select.
21	SPI MOSI	Output	SPI Master Output Slave Input.
22	SPI MISO	Input	SPI Master Input Slave Output.
23	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
24	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
25	SPI CSO	Output	SPI Chip Select.
26	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
27	GND	Power	Ground
28	VCC_12V	Power	12V Power pin.

Pin No	Signal Name	Signal Type	Signal Description
29	VCC_12V	Power	12V Power pin.
30	GND	Power	Ground
31	GND	Power	Ground
32	GND	Power	Ground
33	PCIE RXM	Differential	PCIe differential receive line negative.
34	PCIE RXP	Differential	PCIe differential receive line positive.
35	GND	Power	Ground
36	PCIE REFCLOCK M	Differential	PCIe differential reference clock line negative.
37	PCIE REFCLOCK P	Differential	PCIe differential reference clock line positive.
38	GND	Power	Ground
39	USB HOST DM	Differential	USB 2.0 Host data negative.
40	USB HOST DP	Differential	USB 2.0 Host data positive.
41	GND	Power	Ground
42	VBUS 5V	Power	USB VBUS Power.
43	GND	Power	Ground
44	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
45	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
46	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
47	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
48	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
49	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
50	NC (multiplexed with Bluetooth)	-	By Default, NC. UART transmit is optionally connected.
51	NC (multiplexed with Bluetooth)	-	By Default, NC. UART receive is optionally connected.
52	GND	Power	Ground
53	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
54	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
55	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
56	GPIO	I/O, 3.3V CMOS	3.3V CMOS General Purpose input/output.
57	GND	Power	Ground
58	VCC_1V5	Power	1.5V Power pin.
59	VCC_1V5	Power	1.5V Power pin.
60	GND	Power	Ground
MF-C-1	GND	Power	Ground
MF-C-2	GND	Power	Ground
MF-D	VCC_3V3	Power	3.3V Power pin.

Pin No	Signal Name	Signal Type	Signal Description
MF-A-1	GND	Power	Ground
MF-A-2	GND	Power	Ground
MF-B	VCC_5V	Power	5V Power pin.

#### 2.5 Software Specification

iWave HMI deliverables include BSP for Linux/Android and libraries for GUI development.

Linux is a family of free and open-source software operating systems. Yocto framework is used for Linux based HMI and 4.1.15 kernel and boot loader version are used in Linux BSP. iWave's Android based HMI comes up with Android Nougat version 7.1.1.

As our BSP comes with pre-integrated Open source GUI libraries which helps the user to build a rich and interactive GUI on iWave's HMI platform

#### 2.5.1 BSP Contents and Features

BSP offers flexibility to incorporate Industrial protocols, open source protocols and application for any automated GUI Applications. Depending on customer OS requirement (Linux/Android) corresponding Linux BSP or Android BSP will be provided.

Items	Name	Description
Kernel	Linux 4.1.15	Linux Source code based on 4.1.15 version
Boot loader	U-Boot 2016.03	Primary Boot Loader program
File System	Yocto 2.1 KROGOTH	Linux file system
Tool Chain	GCC Version 5.3.0 (GCC)	Cross Compiler Tool
ТооІ	MFG Tool	Flashing Tool
Binaries for Linux	U-Boot, ulmage & DTB Rootfs	U-Boot Image, Kernel images and Device Tree Binaries, Linux File System
Binaries for Android	U-Boot, Boot Image, Recovery Image, System Boot Image, User Data image	U-Boot Image, Kernel Image & Device Tree, Factory Reset or Reset the Original OS Version, Android File System Application Data Storage for the system application

#### Table 7 BSP Contents

#### Table 8 BSP Features

Items	Name	Description
Boot loader	U-Boot	Primary Boot Loader Program.
OS	Linux 4.1.15 Android 7.1.1	Linux OS. Android 7.1.1 version OS

Items	Name	Description
	USB	USB driver with Host and OTG support.
	Ethernet	Ethernet Driver with TCP/IP protocol support.
	SDHC	SDHC driver.
	Wi-Fi (SPI/SDIO)	802.11 b/g/n Wi-Fi Host-Client support.
	Bluetooth (UART)	BT/BLE 4.0 with GAP and GATT profile.
	Touch	Capacitive Multi Touch I2C driver.
Drivers supported	UART	RS232, RS485 (full/half duplex).
in Linux and	SPI	SPI driver.
Anuroiu	12C	I2C driver.
	PWM	PWM Brightness Control, Buzzer.
	GPIO	GPIO driver.
	Watchdog	Watchdog driver.
	Audio	Audio line out support.
	LVDS	LVDS display driver.
	CAN	CAN driver.
	QT OPEN Source Libraries	Qt5.7 version libraries.
	Web Browsers	Web page browsing feature support is provided.
	PDF Viewer	PDF viewer support is provided.
Linux Library/Packages/	JRE	Java Run Time support is provided.
Applications	Multimedia Applications	Multi Media Applications like GThumb, VLC, Gstreamer and Image viewer are supported.
	OpenSSL Libraries	OpenSSL library is provided.
	OpenCV Libraries	OpenCV library is provided.
Android Library/Packages/ Applications	Android 7.1.1 Standard Library/package/Applicatio ns	Library/package/Application Supported in Android version 7.1.1 is provided.
	Audio	Audio Test Application.
	Buzzer	Buzzer Test Application.
	LCD	RGB pattern display application.
Diagnostic Testing	Touch	Finger paint application.
Applications	Ethernet	Ping with TCP/IP Test.
	Wi-Fi	Connect and Ping Test.
	Bluetooth	Pairing, Connecting and Ping Test.
	RTC	Get/Set Time Test.

Items	Name	Description
Tool Chain	GCC Version 5.3.0	A cross compiler tool to develop Application

#### 2.6 Pre-Compliance Test Specification

iWave HMIs are engineered to meet the below Pre-Compliance test standard.

Table 9 Pre-Compliance Test Spec	
----------------------------------	--

Test Type	Test	Test Standard
	Electrostatic Discharge (ESD)	IEC 61000-4-2:2008
	Electrical Fast Transient (EFT)	IEC 61000-4-4:2012
	Surge	IEC 61000-4-5:2014
	Voltage Dips and Interruption	IEC 61000-4-11:2004/2017
Immunity Test	RF Electromagnetic Field	IEC 61000-4-3:2006/A1:2007/A2:2010
	Radiated electromagnetic field from digital radio	ENV 50204
	Power Frequency magnetic field	IEC 61000-4-8:2009
	Conducted Disturbance Induced by	IEC 61000-4-6:2013
	Protection against electrical Shock	IEC 61140
Emission Test	Conducted Emission	EN55032/ CISPR32
	Radiated Emission	EN55032/ CISPR32

### 2.7 Ordering Information

Part Number	Description	
IW-G38H-07PCT-G1501-PF07HSKAI	Solo Core i.mx6 based Panel Mount HMI with 7 Inch Display	
	and Projected capacitive touch	
IW-G38H-10PCT-G1501-PE10HSKAL	Solo Core i.mx6 based Panel Mount HMI with 10.1 Inch	
	Display and Projected capacitive touch	
IW-G38H-12PCT-G1501-PF12HSKAI	Solo Core i.mx6 based Panel Mount HMI with 12.1 Inch	
	Display and Projected capacitive touch	
IW-G38H-07PCT-G152L-PE07HSKAL	Dual Lite i.mx6 based Panel Mount HMI with 7 Inch Display	
	and Projected capacitive touch	
IW-G38H-10PCT-G152I-PF10HSKAI	Dual Lite i.mx6 based Panel Mount HMI with 10.1 Inch	
	Display and Projected capacitive touch	
IW-G38H-12PCT-G152I-PF12HSKAI	Dual Lite i.mx6 based Panel Mount HMI with 12.1 Inch	
	Display and Projected capacitive touch	
IW-G38H-07PCT-G1504-PE07HSKAI	Quad Core i.mx6 based Panel Mount HMI with 7 Inch	
	Display and Projected capacitive touch	
IW-G38H-10PCT-G1504-PF10HSKAI	Quad Core i.mx6 based Panel Mount HMI with 10.1 Inch	
	Display and Projected capacitive touch	
IW-G38H-12PCT-G1504-PF12HSKAI	Quad Core i.mx6 based Panel Mount HMI with 12.1 Inch	
	Display and Projected capacitive touch	
Note: Contact iWave Systems for 4.3 Inch based HMI Configuration		



# **Mouser Electronics**

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

iWave Global:

IW-G38H-07PCT-G152L-PE07HSKAL IW-G38H-10PCT-G152L-PE10HSKAL