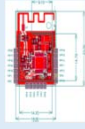



**Hue Engine V1.0**

Specification item	Value	Unit	Condition
			
<p>The Hue Engine is a general purpose Zigbee certified building block for Hue connected lighting applications e.g. Hue White, Hue White Ambiance and Hue White and Color ambiance for lamps and luminaires. It does not work stand-alone but is meant to be SMT soldered on a application specific motherboard that contains the proper interfacing for stand-alone usage.</p>			
<b>Description</b>			
<b>Logistical data</b>			
I2NC	929001263055		
Minimum Order Quantity	500	PCE	
<b>Electrical input data</b>			
Vcc voltage	3.0-3.6	Volt	Ripple<50 mV
Current (normal)	25	mA	
<b>Electrical output data</b>			
Average power consumption	85mW	Watt	
PSU wattage	<60W	Watt	maximum wattage
Standby power	<150mW		
			
<b>Wiring &amp; Connections</b>			
I/O definition			
Ground	1	GND	
ADC2, e.g. for voltage sensing	2	ADC2	
ADC1, e.g. for current sensing	3	ADC1	
to be used as ADC (e.g. NTC read-out), I2C, SPI or PWM	4	Mixed_out_1	
to be used as ADC, I2C, SPI or PWM	5	Mixed_out_2	
General purpose in/out 1: E.g. for button control	6	GPIO1	
General purpose in/out 2: E.g. for button control	7	GPIO2	
i.e. for current source	8	Enable	
PWM output	9	PWM_CH0	
PWM output	10	PWM_CH1	
PWM output	11	PWM_CH2	
PWM output	12	PWM_CH3	
PWM output	13	PWM_CH4	
Ground	14	GND	
3V power in	15	VDD	
Used for SW programming, UART bus communication	16	TXD	
Used for SW programming, UART bus communication	17	RXD	
Used for SW debugging	18	Nreset	
Used for SW debugging	19	SWCLK	
Used for SW debugging	20	SWDIO	
<b>Features &amp; Functions</b>			
Hue White Color Ambience	yes		
Hue White Ambiance	yes		
Hue White	yes		
Dimming	yes		
Device diversity	yes		by late state configuration
Automatic color consistency	yes		
OTA upgrade	yes		Over the air upgradable when connected to the Hue Bridge
<b>Wireless specifications</b>			
Wireless RF mode frequency band	2400 - 2483.5 MHz	MHz	
Wireless communications protocol	IEEE 802.15.4	ZigBee Light Link protocol	
Operating channel	11 - 26	channels	
Range	12	meter	indoor
Frequency tolerances (Typical)	+/-30	ppm	Continuous single tone
Output power (Typical)	4	dBm	Measured at antenna feedpoint
Spurious emissions* (Typical)	-36	dBm	30 - 1000MHz
	-30	dBm	1 - 12.75GHz

	-47	dBm	1.8 - 1.9GHz
	-47	dBm	5.15 - 5.3GHz
EVM (Typical)	15	%rms	
Receiver Sensitivity (Typical)	-99	dBm	PER < 1%
TRP	-2	dBm	when mounted on a motherboard of 30x40mm (i.e. Hue Connect)
<b>LED board requirements</b>			
Hue White Color Ambience	Unified Gamut		covered by L1.5 specifications
	Tunable white CCT range: 2000-6500K		
	CRI > 80 for CCT 2000-4000K		
	CRI > 65 for CCT 6500K		
	R9 > 0 for CCT 2000-4000K		
	Color consistency: 95% within 5SDCM		covered by L1.5 specifications
	Minimum dim-level: 2%		
Hue White Ambiance	Tunable white CCT range: 2000-6500K		
	CRI > 80 for CCT 2000-4000K		
	CRI > 65 for CCT 6500K		
	R9 > 0 for CCT 2000-4000K		
	Color consistency: 95% within 5SDCM		covered by L1.5 specifications
	Minimum dim-level: 2%		
Hue White	2700K / 3000K / 4000K		
	CRI > 80		
	R9 >		
	Color consistency: 95% within 5SDCM		covered by L1.5 specifications
	Minimum dim-level: 2%		
<b>Insulations</b>			
<b>Dimensions &amp; Weight</b>			
Length	23.5	mm	±10% tolerance
Width	18	mm	±10% tolerance
Height	3.7	mm	±10% tolerance
Fixing hole diameter	NA	mm	
Fixing hole distance	NA	mm	
Weight		gram	
<b>Operational temperatures and humidity</b>			
Ambient temperature	-10 to 50°C	Celcius	
Tcase-max	70°C	Celcius	to be measured on Hue Engine shield
Maximum housing temperature			
Relative humidity			Non-condensing
<b>Storage temperature and humidity</b>			
Ambient temperature			For 6 months
Relative humidity			Non-condensing
<b>Lifetime</b>			
lifetime		hours	Measured temperature at Tc-point is Tcase- max. Maximum failures = 10%
<b>Surge capability</b>			
ESD rating	+/-2	KV	Contact
	+/-4	KV	Air
<b>Certificates and standards</b>			
Approval marks	CE, FCC, ETSI, ROHS & REACH, ZLL		
Compliances and approvals			

FCC

FCC Labelling Requirements

When integrating HUE Engine V1.0 into a product it must be ensured that the FCC labelling requirements are met. This includes a clearly visible label on the outside of the finished product specifying the FCC identifier (FCC ID:2AGBW9290012630X). This exterior label can use wording such as "Contains Transmitter Module FCC ID: 2AGBW9290012630X" although any similar wording that expresses the same meaning may be used.

Note: Changes or modifications made to this device that are not expressly approved by Philips Lighting North America Corporation( "Philips" ) may void the user's authority to operate the device.

The advance interface module complies with FCC radiation exposure limits set forth for an uncontrolled environment.

The module and associated antenna must be installed to provide a separation distance of at least 20cm from all persons and must not transmit simultaneously with any other antenna or transmitter.

FCC Approvals

FCC statement:

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC notice:

This device has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the device and receiver
- Connect the device into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for help .

IC (Industry Canada) Approvals

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication

This module complies with FCC and Industry Canada RF radiation exposure limits set forth for general population. To maintain compliance, this module must not be co-located or operating in conjunction with any other antenna or transmitter

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi) and required impedance for each.

The labelling requirements for Industry Canada are similar to those of the FCC. Again a clearly visibly label must be placed on the outside of the finished product stating something like "Contains Transmitter Module, IC-ID: 20812-2630X" , although any similar wording that expresses the same meaning may be used.

IC

	<p>Le présent appareil est conforme aux CNR d' Industrie Canada applicables aux appareils radio exempts de licence. L' exploitation est autorisée aux deux conditions suivantes: (1) l' appareil ne doit pas produire de brouillage, et (2) l' utilisateur de l' appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d' en compromettre le fonctionnement.</p> <p>En vertu de la réglementation d' Industrie Canada, cet émetteur radio risquera uniquement à l' aide d' une antenne de type et de gain maximum (ou moins) pour l' émetteur a approuvé par Industrie Canada. Pour réduire les interférences radio potentielles à d' autres utilisateurs, le type d' antenne et son gain doivent être choisis que la puissance isotrope rayonnée équivalente (p.i.r.e.) n' est pas plus que celle autorisée pour une communication réussie</p> <p>Ce module est conforme à la FCC et Industrie Canada RF limites d' exposition aux rayonnements définies pour l' ensemble de la population. Pour maintenir la conformité, ce module ne doit pas être co-implanté ou fonctionner en conjonction avec toute autre antenne ou émetteur</p> <p>À la suite de l' avis ci-dessus, le fabricant doit fournir une liste de tous les types d' antenne approuvés pour une utilisation avec l' émetteur, indiquant au maximum gain d' antenne (en dBi) et impédance requise pour chacun.</p>
	<p>Les exigences d' étiquetage pour Industrie Canada sont semblables à celles de la FCC. Encore une fois un clairement visiblement étiquette doit être placée à l' extérieur du produit fini indiquant quelque chose comme "Module émetteur de Contains, IC ID: 20812-2630 X", bien que tout même libellé qui exprime que le même sens peuvent être utilisé.</p> <p>IC notice: This Class B complies with Canadian ICES-005.-- Cet appareil numérique de la classe B est conforme à la norme NMB 005 du Canada</p>
CE	<p>European Certification (ETSI) The module have been certified to the following standards:</p> <ul style="list-style-type: none"> <li>• Radio: EN 300 328:V1.9.1</li> <li>• EMC: EN 301 489-17:V2.2.1</li> <li>• Safety: EN 60950-1:2006 / A12:2011</li> </ul> <p>If the module is incorporated into an OEM product, the OEM product manufacturer must ensure compliance of the final product to the European Harmonized EMC, and low voltage/safety standards</p>
JP TELEC	<p>This exterior label can use wording such as "Contains Transmitter Module  R203-JN0551" although any similar wording that expresses the same meaning may be used.</p>
	<p>This exterior label can use wording such as "Contains Transmitter ModCMIIIT ID: 2016DP1856" although any similar wording that expresses the same meaning may be used.</p>
CN SRRC	
<i>Inrush current</i>	
<i>Earth leakage current</i>	

Hue Connect 24V DC in/out 60W HWCA V1.0

Specification item

Value

Unit

Condition



The Hue Connect is a motherboard that accommodates the Hue Engine. Its application is intended to be used for color tunable luminaires. In combination with the a 24V DC power supply and defined L1.5 LED kit, color consistency can between luminaires or light points within a luminaire can be guaranteed.

<i>Description</i>			
<b>Logistical data</b>			
I2NC	929001263155		
Minimum Order Quantity	1024	PCE	
<b>Features &amp; Functions</b>			
<b>Electrical input data</b>			
Input power	60W		
Current of single channel	2.5A	Ampere	
Electrical output data		Watt	
Voltage	24V	Volt +/-1V	
Average power consumption			
Standby power			
<b>Wiring &amp; Connections</b>			
J1 connector			Output to Sensor or 2nd light source
GND	1 GND		
3V3 supply to auxiliary microcontroller of sensor / 2nd light source	2 VDD		
Input pin for simple sensor or reset pin for auxiliary micro	3 GPIO1		
I2C	4 SDA		
I2C	5 SCL		
Input pin for simple sensor or reset pin for auxiliary micro	6 GPIO		
J2 connector			connector to L2 LED board
VBUS	1		
Pin connects to Red (Hue), 2200K (Tone), 2700K (Lux) or 4000K (Lux)	2		
Pin connects Green (Hue or Tone) or Lime (Tone) to GND via MOSFE	3		
Pin connects Blue (Hue) or 6500K (Tone) to GND via MOSFET	4		
Pin connects 2200K (Hue) to GND via MOSFET	5		
Pin connects 6500K (Hue) to GND via MOSFET	6		
J3 connector			Power in
24V	1		
GND	2		
J4 connector			Program connector (internal use)
<b>Operational temperatures and humidity</b>			
Ambient temperature	-10 to 50°C	Celcius	
Tcase-max			
Maximum housing temperature			
Relative humidity			
<b>Storage temperature and humidity</b>			
Ambient temperature			
Relative humidity			
<b>Lifetime</b>			
lifetime			
<b>Surge capability</b>			
ESD rating	+/-2	KV	Contact
	+/-4	KV	Air
<b>Certificates and standards</b>			
Approval marks			
Compliances and approvals			

*Inrush current*

*Earth leakage current*